PB-230 547

POLLUTION OF THE INTERSTATE WATERS OF THE GRAND CALUMET RIVER, LITTLE CALUMET RIVER, CALUMET RIVER, WOLF LAKE, LAKE MICHIGAN AND THEIR TRIBUTARIES. PROCEEDINGS OF CONFERENCE HELD AT CHICAGO, ILLINOIS ON MARCH 2-9, 1965. VOLUME 4

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UNITED STATES DEPARTMENT
OF
HEALTH, EDUCATION, AND WELFARE

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Conference in the matter of pollution of the interstate waters of the Grand Calumet River, Little Calumet River, Calumet River, Lake Michigan, Wolf Lake and their tributaries (Indiana-Illinois).

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MR. MURRAY STEIN, CHAIRMAN

****

McCormick Place
Banquet Room
9:30 o'clock a.m.
March 5, 1965
Chicago, Illinois

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CONFEREES:

MR. H. W. POSTON,

Department of Health, Education, and Welfare,
U. S. Public Health Service, Division of
Water Supply & Pollution Control,
Regional Program Director, Illinois

MR. BLUCHER A. POOLE, Technical Secretary, and
MR. PERRY MILLER,

Stream Pollution Control Board,
State Board of Health, Indiana

MR. CLARENCE W. KLASSEN, Technical Secretary, and
MR. RICHARD NELLE,

State Sanitary Water Board, Department
of Public Health, Illinois.

MR. FRANK W. CHESROW, President, and
MR. GEORGE A. LANE,

The Metropolitan Sanitary District of
Greater Chicago, Illinois

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CHAIRMAN STEIN: May we reconvene?

The conference will come to order and reconvene.

On my right now is Mr. Robert Snyder. Mr. H. W. Poston will be a few minutes late.

Mr. Poole?

MR. POOLE: I went over the list of Indiana people that were still on the agenda last night and it is impossible for us to finish the Indiana presentation today if everybody talks.

We are very anxious to finish today, but on the other hand, we don't want to shut anyone off that we feel or he feels has a real message which is apropos to the subject under discussion here.

Now the thing I am proposing is that we utilize our time wisely today. We have the large industries, all of whom I believe I have left on my list that have been mentioned in the Health, Education, and Welfare Report, and then we have the smaller industries in the municipalities and I would hope the others that are on our agenda. For those who have prepared statements, bring them up to Mr. Perry Miller and me. Maybe with some help we can get those all in at the morning intermission. We will see that your statements are not only filed in the record but if you want to leave eight copies, that copies are passed around the table for each of the conferees. The people that I think we must hear today, and I am referring to United States Gypsum--should I take

United States Gypsum off?

A VOICE: You have a statement.

MR. POOLE: We will put in the record the statement of the United States Gypsum Company.

STATEMENT OF THE UNITED STATES GYPSUM COMPANY

The United States Gypsum Company, 101 South Wacker Drive, Chicago, Illinois, having been designated by the State of Indiana Stream Pollution Control Board as a participant in a conference in the matter of pollution of certain interstate waters in Illinois and Indiana, submits the following statement to the conferees:

It has long been the policy of the United States Gypsum Company to cooperate fully with local, state and Federal authorities in their efforts to reduce and even to eliminate water pollution. Consistent with that policy, the United States Gypsum Company constructed its East Chicago, Indiana, facility so as to minimize the quantities of material which might be discharged into the Indiana Harbor Canal. The Company's early recognition that substantial efforts should be made to reduce water pollution is no doubt largely responsible for the fact that today the relative quantity of industrial wastes discharged into the Indiana Harbor Canal from its East Chicago plant is extraordinarily small.*

* See Table VI-5c, Report on Pollution of Waters of the Grand Calumet River, Little Calumet River, Calumet River, Lake Michigan, Wolf Lake and Their Tributaries prepared by the U.S. Department of Health, Education, and Welfare, etc., February 1965.

Since its East Chicago plant was originally constructed, the United States Gypsum Company has taken additional steps to further minimize the quantity of any industrial wastes which might be discharged into the Canal. Although it has no way of accurately estimating the quantity or type of material which may be discharged into the Canal, the Company believes that the "suspended solids" referred to in the HEW Report of February 1965 consist either largely or entirely of fine gypsum dust. In 1951 the Company spent substantial sums to install dust collectors at various locations throughout its plant to catch the fine gypsum dust generated during the manufacturing process. These dust collectors sharply reduced the quantity of dust which have been discharged into the Canal. Furthermore, the Company has for some time been working on a plan to increase the effectiveness of these dust collectors. If this plan proves feasible, it is believed that the increased efficiency of these machines would very materially reduce whatever small amount of gypsum dust might currently be discharged into the Canal.

In addition to the dust collectors, the

Company has long utilized pieces of machinery called Save-alls. This machinery catches virtually all the cement, asbestos, and sand passing through it from the Company's shingle plant and retains these materials for re-use in the manufacturing process, thus preventing their being discharged into the Canal. These Save-alls, in conjunction with the dust collectors, have enabled the Company to keep the quantity of whatever solid material may be discharged into the Canal down to quite insignificant amounts.

In conclusion, the United States Gypsum Company reaffirms its willingness to continue to cooperate fully with those who seek to decrease the quantities of polluting substances discharged into the Nations waterways.

Dated: March 2, 1965

Norman A. Lang
Assistant Secretary
United States Gypsum Company

UNITED STATES GYPSUM COMPANY

Mr. B. A. Poole
Technical Secretary
State of Indiana
Stream Pollution Control Board
1330 West Michigan Street
Indianapolis, Indiana 46207

March 4, 1965

Dear Mr. Poole:

I have just had a chance to examine your most thorough and complete presentation to the conference on Grand Calumet River, Little Calumet River, Calumet River, Lake Michigan, Wolf Lake and tributaries (Indiana-Illinois) called by Secretary Anthony J. Celebrezze, Department of Health, Education, and Welfare starting March 2, 1965, at Chicago, Illinois, dated February 1965. While I find that the portions of that report dealing with the United States Gypsum Company are generally accurate, there is one error therein which I would like to call to your attention.

The table on page 51 of the Report states, in effect, that the United States Gypsum Company has no industrial waste treatment. As I pointed out in my statement to the conference on March 4, 1965, the United States Gypsum utilizes both dust collectors and save-alls whose combined effect is to reduce sharply whatever solid material may be discharged into the Indiana Harbor Canal from its East Chicago Indiana plant. I believe these machines qualify as industrial waste treatment devices and should have been so included in your report.

Sincerely,

Norman A. Lang
Assistant Secretary
United States Gypsum Company

MR. POOLE: Then, Youngstown Sheet and Tube and Inland Steel. Then, I am going to do something that I swore yesterday I wouldn't, and that is we've got two people that have to make plane connections and we would follow Inland Steel by Bethlehem and follow Bethlehem Steel by Midwest and then come back to United States Steel.

Then, we would have Union Carbide, American Oil, American Maize and the City of Hammond and Lever Brothers.

Now, this is without question going to take a good portion of the day.

So, I will take it by consent and if somebody feels that he just must speak, all he needs to do is not bring his prepared statement up here at the morning recess.

We will now call on Youngstown Sheet and Tube, Mr. A. J. Cochrane, Assistant to the Operating Vice President.

CHAIRMAN STEIN: For the record, Mr. Ben Leland is now sitting with Mr. Klassen for Illinois.

Mr. Leland is in charge of the Chicago office.

MR. COCHRANE: Mr. Chairman, conferees, ladies and gentlemen: My name is A. J. Cochrane, and I am Assistant to the Operating Vice President of the Youngstown Sheet and Tube Company. We have a plant located at East Chicago on the Indiana Harbor Canal.

Mr. B. A. Poole of the Indiana Stream Pollution Control Board has asked us to tell you of our progress in the Indiana Harbor Works waste control program. I will review for you, first, some historical aspects of the area water problems; second, the program we have under way for solving them; and last, the considerable progress we have made in the past few years and the scheduled program with the State of Indiana for the future.

In much of the Nation the accepted way of life until after World War II permitted the discharge of untreated sewage and industrial wastes into the waterways. That way of life has been changing. With increasing recognition of the value of the water resource, efforts to protect it are providing accomplishment.

The Lake County, Indiana - Cook County, Illinois, area preceded most of the Nation in doing something about its waste problems. Reports already given are testimony to this. The motivation was protection to health. That goal was accomplished. The citizens of the area do have safe drinking water.

In order to accomplish this, however, unique approaches were employed. The location of this metropolitan area in the pocket at the south end of Lake Michigan made the unique approach a necessity.

Since the known methods for treatment of wastes leave a residual, there must be some course for ultimate disposal.

To provide it in this area required reversal of a river. It also took a court to get agreement and action started, but the job was done.

The provisions for pollution abatement to meet the court decree represented the best engineering talent then available for both municipal and industrial treatment. Since then our understanding of the effects of pollution has developed. So has the potential for pollution, for this area has experienced large industrial growth with a variety of industries. These industries have offered jobs and jobs bring people, so the population has increased as well.

The waste treatment facilities considered adequate 20 years ago anticipated neither this growth nor the wastes which new industrial processing would create. The increasing concentration of municipalities and industries is but part of the story. The hurdle of geographic location faced by those who started protecting the water supplies over 60 years ago still remains as a major factor.

This is particularly so in the Indiana Harbor Ship Canal. Flow in the Canal may be to Lake

Michigan, away from the Lake or stationary. The Indiana Harbor Ship Canal drains the Grand Calumet River and carries the discharges from sewers of cities, steel, oil and chemical companies. Because it can hold stationary for periods of time -- with little or no flow to the Lake -- wastes can accumulate and then with a change in wind direction or with rainfall in the area, the Canal content moves into the Lake.

As the representative of the Youngstown Sheet and Tube Company, I want to tell you about how our program is influenced by this Canal and how we are attempting, with State guidance, to determine with sound data both cause and effect so that the construction of treatment facilities will provide adequate protection of the water resource.

The Indiana Water Pollution Control Board has given this conference a summary report on accomplishments in preventing and abating pollution in Lake County. Undoubtedly, these actions would not have taken place without the Board's direction and insistence. There may have been a change in attitude by the public in what is acceptable but mental attitude by the public must be translated to specific directives and objectives if effective pollution abatement facilities are to be constructed.

The Indiana Board's policy has been to require adequate treatment for all new production facilities and a continuing program for controls on older process operations. Our Company has been complying with that policy. However, as was mentioned earlier, facilities which would be adequate without question on a flowing stream may not do the job on this tidal Canal.

The HEW report has summarized the occurrences of problems at water supply intakes, on the beaches and in respect to the appearance of the Ship Canal. The report has also provided data on maximum and average concentrations of some of the water quality characteristics measured during its comprehensive three-year survey.

In some respects the data as presented are inaccurate but of greater significance, in our opinion, the report offers no real guidance for solution of the more difficult problems. The recommendation for exclusion of certain types of waste discharges is totally unreasonable for an area so heavily industrialized and which uses such vast volumes of water in processing. The alternative offered of treatment is without guidelines as to either method or degree.

The proposal that the companies institute permanent programs of sampling waste discharges to provide more complete information on the waste characteristics and then provide the data to the State to be kept in open files does not provide guidance to answer problems. It does offer the concept that pollution is measured by the sum of the discharges, not by the quality of the receiving water.

The concept of the State of Indiana and much of industry, certainly Youngstown Sheet and Tube, is to determine what water uses are being affected and what causes the adverse effect. Past surveys by this Company have shown that it takes more than the routine proposed in this report to accomplish protection of water.

If the cleanup of the Indiana Harbor Ship Canal, and we agree it is polluted, is to be accomplished within a reasonable time, the answer must be something other than total exclusion of discharges or long-term detailed chemical analyses of discharges.

A first requirement is to determine the water uses to be protected and the quality necessary for that protection. This means there must be a reconciliation of individual opinions and desires and a determination of what uses are in the best public interest.

As an example, the water intakes in Lake Michigan should with reasonable treatment be able to provide safe and palatable water. Another example would be recognition that the Indiana Harbor Ship Canal is an industrial harbor and not a site for recreation.

In this report I hope to convey to you some of the concepts which guide our pollution control program and to show the accomplishments to date and scheduled as well as some of the problems remaining. The program has been a continuing one and directed to meet State requirements of protecting reasonable water uses.

Indiana Harbor Works

To set the background, let me point out that The Youngstown Sheet and Tube property is on the west shore of the Indiana Harbor Ship Canal and fronts on Lake Michigan. The Indiana Harbor Works is an integrated steel plant with 3 blast furnaces, coke plant, open hearth furnaces, rolling mills, pipe mills and sheet and tin mills. The district employs an average of 11,000 persons and has a rated capacity of 3,420 ingot tons annually.

The Company is presently expanding its operation. To provide the necessary land for a multimillion dollar expansion, a slag fill protected by a breakwater is being extended into Lake Michigan.

Water Supply

The district purchases its drinking water from the City of East Chicago. There is some limited use of this for industrial operations.

Industrial process and cooling water is supplied by two large pumping stations.

No. 1 intake is located at the entrance to the canal, within the breakwater. This station provides 132 million gallons a day. Since it pumps water from the canal, the quality of the water is the same as that in the canal. Measuring the concentration of substances in this water when it leaves the plant gives an impression of waste discharged even when nothing is added by the plant operation. Unless waste loads discharged from a plant are corrected by substracting the intake loads, the data are in error.

No. 2 intake is located on Lake Michigan. This station at present provides 101 million gallons a day.

As plant enlargement requires more water, the additional supply will be taken from the lake. And as part of the Company's program for water control, the present plans include the eventual abandonment of the canal intake and the obtaining of the total supply from the lake. This will automatically reduce the measured waste load to the canal. It will also provide more of a diluting effect on the waters in the canal.

Sewage

All sewage from the plant is connected directly to the East Chicago sewerage system. None is discharged from our plant directly to any waterway.

All sewage from the sanitary facilities to be located in the new mill construction will also be connected to the municipal sewers.

Blast Furnaces

There are three blast furnaces in which iron ore, limestone and coke are processed to free the iron from impurities. The large volumes of hot air forced through the furnaces carry some of this charged material out. This flue dust is partially recovered in dry dust catchers and the gas is then washed with water to remove the remaining solids. This gas washer is clarified in two large settling basins called thickeners.

One approach is to provide more effective recovery to change the method of washing the gas. Use of venturi washer reduces the amount of water required by half. This in turn increases the time the water stays in the thickener and provides more time for the solids to settle down.

One gas washer has been changed to include the new type cleaning. Since installation requires the furnace to be down, installation on the other units will be scheduled with furnace relining.

The Company has also been working on means to recycle the blast furnace gas washer water so that there will be no discharge to the stream. Such a program is now under way at the Youngstown district plant. With any new furnace construction at Indiana Harbor the closed system would be included.

Of particular importance is the effect of changing technology on waste loads. New methods for preparing sinter and operating the furnace have reduced the flue dust produced from 300 pounds per ton to 97 pounds at the Harbor plant.

Rolling Mills

The polluting materials originating in rolling mills are mill scale and oil. The scale is broken loose by high pressure water sprays from the ingots, billets, strip or pipe and flushed to settling basins where it can be prevented from going to the canal or lake. Lubricating oil lost on the mills is also carried by this cooling and flushing water.

Because the scale pits in the main part of the steel plant were too small to be modified for effective scale removal, a new, very large scale pit was constructed at the Lake Shore in 1956 and the three sewers which carried the discharges from the existing scale pits were connected to it. In 1964, oil recovery facilities were added to provide continuous oil removal. Prior to that when oil accumulated it would be pumped out.

When the seamless mill was constructed in 1955 an adequately sized basin was provided to settle scale and trap oil. This discharge and the discharge from the large terminal settling basin just described are the only two on the lake front.

Turning to the canal discharges, the hot strip mill is the principal source of scale and oil. In 1957 a new scale recovery basin was installed. This basin is adequately sized and has a bucket crane located over it to permit regular cleaning. Oil recovery from this unit has not been effective, so a new oil recovery system was designed and is now under construction.

Completion of the project is scheduled for April 1965. This source is the largest oil loss in the plant, amounting to about one half the total loss.

The only other scale pit is at a small pipe mill operation. This scale pit requires modification by installation of baffling to make it effective. This is scheduled as part of the program.

There are three rolling mills with sewers discharging to the canal. In the cold rolling operations an emulsified oil is used. Such oils are dispersed in water as long as there is adequate agitation. When the oil-water mixture is allowed to stand quiescent, the oil separates and floats on the surface.

The practice on these cold rolling mills is to recycle the oil-water mixture until it becomes dirty. Then the solution is replaced. Survey work by Youngstown Sheet and Tube on movement of odor bearing substances through water showed the important role such soluble oils could have.

With the building of the new 6 stand rolling mill, facilities were provided for breaking the emulsion, separating and recovering both the oil and the accumulated fine scale.

The other two cold rolling mills are older operations. To prevent difficulty from these mills, the oil emulsion solutions are hauled to a slag dump for disposal. These solutions formerly were discharged to the Canal.

For the new installations under construction on the lake front a new approach has been adopted. The sewers from this area discharge to the lake behind the breakwater. Since the mill scale in some finishing mill operations is so fine, it presents a color problem rather than an accumulation of solids. To handle this the cooling waters in the mills have been separated from processing water which could contain either solids or oil. The process water after it leaves the scale basins discharges into a pond or lagoon which is being developed in this new fill area.

The lagoon will permit solids to settle and oil to separate. The water will reach the lake by filtering through the slag fill.

There is also a new cold rolling mill under construction in this area. Treatment facilities are provided to break the oil emulsions and separate and recover the oil and solids. To provide additional insurance the discharge from this treatment plant also goes to the lagoon.

Spent Acid

The cleaning of steel in acid is called pickling and the solution is called pickle liquor.

There has been a continuing program of providing intercepting storage sumps and pumps to lift the accumulated spent acid to trucks for haulage to the slag dump for disposal. When the spent acid is dispersed over the slag, it is neutralized by the limestone in the slag.

Such facilities and haulage of acid have been provided for conduit plant (1950), sheet mill (1952-53), tin mill (1955), merchant mill (1962), sheet mill (1963).

The majority of the acid is now hauled to the slag disposal area. Only the hot strip mill area acid is discharged to the canal.

YS&T is presently evaluating a new pickling practice which can change the technology of pickling. It offers the possibility of recovering and reusing acid rather than loss or haulage.

Metal Finishing

When the halogen tin mill was constructed in 1955, provision was made in accordance with the Indiana Water Pollution Control Board regulation for an intercepting sump which is not connected to any sewer. This sump is to catch any solution which might be accidentally or deliberately discharged in the process area. The waste is pumped to an elevated holding tank where it is loaded into trucks and hauled to a slag disposal area. There is also a neutralizing sump to provide mixing and control for rinse waters.

Repeated surveys using dyes and chemical analysis have never indicated any of this material reaching the lake from the slag disposal area.

Continuous sampling and daily analysis on the sewer discharge carrying the rinse waters to the canal are maintained as part of the state requirement. In addition there is a daily analysis for the same constituents in the canal. This acts both as a check on the waste discharge and as background on canal water quality to determine the influence of this operation.

Coke Plant

The HEW report correctly put emphasis on the occurrences of taste and odor at the public water intakes in Lake Michigan. The report, however, attempted to utilize phenols as the means of tracing and assessing responsibility for the trouble.

The fallacy of the approach has been well documented. Measurement of phenol in water is indicative of wastes from coke plants, chemical industry refineries or even decaying vegetation as well as sewage. However, not all tastes and odors are due to phenol, and a program which would ignore causes of taste and odor unless associated with phenol offers little real help to the water plants.

The YS&T work in tracing taste and odor causes at times of occurrence of trouble at a water works is an example of the philosophy expressed earlier in this report. Several years of surveys on the

Mahoning River provided adequate proof that phenol in itself was no criterion of taste and odor. These studies have been reported in the literature.

It was determined that odor can be traced; that odor occurrences can be caused by high concentrations of organics and that at such a time the presence of a particular chemical may predominate and be emphasized by the odor level of the other material even though, if alone in the same concentration, it would not be noticed.

These surveys, utilizing an analytical method for odor developed at Dow Chemical Company, prompted more work on odor analysis and tracing by Mellon Institute, Gulf Oil Corporation, Manufacturing Chemists Association and others and has resulted in the refinement and adoption of the analytical procedure by the American Society for Testing Materials.

This background is given as evidence that solution of some waste treatment problems requires development of means to locate the sources. The work on the Mahoning River showed that attention to phenols had diverted attention from sources of waste which did not carry phenols but which caused very bad tastes in the downstream water supply. When odor was considered as an entity, sources of trouble were found. The reduction in days of trouble at this water intake from 47 days in 1956 to 6 days in 1964 indicates the progress made. When sources of trouble were defined, controls were provided to prevent future difficulty.

The findings from the Mahoning survey are guiding the program at Indiana Harbor. In addition to eliminating the losses of soluble oil, there is a program scheduled in the coke plant to eliminate the occasional losses of organics which have been shown to be high odor carrying material.

The coke plant has a dephenolizer to remove phenolics. There is also an ammonia still to remove the free ammonia and lime is added to spring the fixed ammonia. The dephenolized still waste goes to the canal.

The sources of waste which have been found to be high in persistent odor (even though low in phenol) and which are of importance in causing taste and odor problems are being collected for disposal in the coke quenching. When the organics hit the hot coke they are destroyed. This program will be completed by 1966.

Survey work in the canal and lake during the 1959 steel strike and since has shown the importance of the canal movement in taste and odor effects.

A program is planned with the Gary-Hobart Water Company to identify and trace causes of taste and odor as well as to determine the effectiveness of the present program for eliminating the slug losses.

The HEW report emphasizes the ammonia concentrations found in the Indiana Harbor Canal and along the lake shore. The report observes that these concentrations are much higher than those measured in the middle of Lake Michigan. This should be expected and points up the need to define the uses of the water for the area. Any proposal that the quality of the water in the Ship Canal and along the shore should be the same as that in the middle of Lake Michigan must contemplate closing down industries in Lake County.

The HEW report notes the ammonia concentrations at the Chicago intake as usually less than 0.10 parts per million. In this report these concentrations are considered as high and a significant source of trouble in water plant operation. In the HEW report to the conference on the Mahoning River, in which YS&T participated, there was the statement "Ammonia in surface waters comes from the decomposition of organic matter, and in clean water rarely exceeds a few tenths of a part per million."

This is mentioned not to excuse ammonia discharged from industries but to suggest that all sources of ammonia -- natural, municipal and industrial -- be put into proper perspective and also to determine its effect accurately rather than simply by comparison to the concentration in the middle of Lake Michigan.

Population Equivalents

We would be remiss if in reporting on this program at Indiana Harbor we did not suggest that the conferees correct the misimpression held by many after reading the HEW report that our discharges had a pollution load equivalent to the untreated sewage from 100,200 persons.

It is the Department's standard practice to convert data it obtains on industrial organic discharges to what it calls population equivalents of sewage discharge. While both sewage and industrial organics have an oxygen demand on the river, it is wholly untrue that the industrial organics have any bacterial disease producing potential as does sewage. We feel very strongly that by portraying effluent data in this manner, representatives of the Department of HEW misrepresent the facts and mislead the public. We can only see confusion by this arbitrary conversion and publication of misleading information.

Waste Load Data Reporting

One of the HEW report recommendations calls for permanent sampling of sewer discharges for some 12 or more chacteristics, measurement of flows and reporting monthly on both concentrations and tonnages in the discharges to the state. The recommendation further suggests that these records be kept in open file.

We objected to releasing plant effluent data to HEW prior to and at the Mahoning conference and would like to provide for the record here our objection to reporting of such information for open file records.

Our objections are twofold. The first is that we regard the data as confidential both because some of it is measuring wastes from company processes which are not available to our competitors and because it can easily be interpreted as to volume of production in competitive lines. The second objection is our concern over the misuse which the Department has made of the data in the past.

As an example of the latter consider the reporting of waste discharge data in a report without making allowances for material in the water supply. The report indicates one sewer has a flow of approximately 50 million gallons a day. The sulfate content in the discharge is the same as in the water intake -- about 50 parts per million. This is far below the Public Health Service drinking water standard of 250 parts per million considered as acceptable. The HEW report noted this sewer as contributing 35,000 pounds a day of sulfate to the Canal. Actually, it added none.

We are most willing to work with the State and supply to them such data as the State deems desirable and meaningful.

Recommendations

The HEW report has provided an excellent summary of normal conditions of flow in the lake, the areas of influence on the lake, types of wastes from municipalities and industries and the difficulties experienced by the water companies.

In addition, the report discusses some of the potential future problems which may be anticipated by broader planning of controls on discharges or changes in process operations in new industrial plant expansion to eliminate or minimize such wastes. This planning, however, must be integrated with the operation of the Chicago drainage system and its possible enlargement to include the Grand Calumet area in Indiana.

In line with this, it has been suggested that the diversion of the Grand Calumet to the Chicago drainage system should be provided with a positive continuous withdrawal from Lake Michigan via the Indiana Harbor Ship Canal. This deserves evaluation, for the potential of buildup in the Canal of residual materials even after full treatment could affect Lake quality. This proposal is not appraised in the HEW report. Such a proposal would seem to require additional diversion water.

Of immediate concern are the obvious slug effects on the Lake Michigan water intakes. Since washout of Indiana Harbor might be at times responsible for some of this trouble, the State of Indiana and the industries involved could develop with the water plants a joint monitoring program.

Of longer range is the necessity to decide the programs, municipal and industrial, which would be necessary to provide different quality standards or permit different uses to have priority. Progress in waste control by the Youngstown Sheet and Tube Company has been accomplished in cooperation with the State of Indiana by a planned program of approach. We pledge our continued assistance in answering the remaining problems.

CHAIRMAN STEIN: Thank you. Thank you, Mr. Cochrane.

I wonder if you would wait for questions.

We do have a couple of housekeeping records and announcements that I would like to make as early as possible.

First, I would like to note Mr. H. W. Poston has replaced Mr. Snyder as the Federal conferee, and I want to express thanks to Mr. Nicholas J. Melas, a trustee in the Metropolitan Sanitary District of Greater Chicago and Orville Anderson whom we have known through the years for sitting in temporarily for Colonel Frank Chesrow and Mr. George Lane who are here now.

I would like to give you the schedule, as we see it now for the rest of the conference.

Remember, these are always subject to -- we expect to finish the Indiana presentations today.

As we have roughly computed it here, there are about five hours of statements without questions. Conferees, of course, can ask any questions or make any comments they wish. But, gentlemen, I am afraid I am going to have to keep your nose to the grindstone until we finish tonight. So, the time is yours.

After this, we will recess for the weekend and Monday. We will reconvene again on Tuesday in Room 11 of McCormick Place at 9:30.

At that time, the Sanitary District will make its presentation, the conferees will have their discussion and consultation, and an announcement will be made as to the conclusions and the summary.

In other words, we will recess today after Indiana and on Tuesday we will reconvene in Room 11 of McCormick Place at 9:30 a.m. The Sanitary District will make its presentation, the conferees will have discussion and arrive at conclusions. Announcements will be made and the conference should be brought to a conclusion on Tuesday.

Now, if we may call for comments or questions to Mr. Cochrane -- thank you for waiting. I wanted to make these announcements as early as possible.

MR. KLASSEN: Yes, there are several questions I wanted to ask of Mr. Cochrane, some purely informational and some to clear up a little confusion that exists in my own mind.

About the philosophy -- the way I interpret it here, and I would like to just comment on this -- I refer particularly to your statement on Page 4 when you talk critically of the Report, and I have been in the position at other times of criticizing Health, Education, and Welfare Reports, but certainly not in the same vein that you have commented hare.

"The Report offers no real guidance for solution."

Do I interpret that correctly that you are looking to Government to suggest solutions for your industrial waste problems?

If it is, it is a little contrary to my own concept of free enterprise on one hand for production and then you look to someone else to solve your waste treatment problems.

Is that what you are leaving with us?

MR. COCHRANE: You mean the --

MR. KLASSEN: You stated that the -- "report offers no guidance for the solutions to the more difficult problems."

In other words, you solve the easy ones and when you get to the difficult ones you expect the Government to give you the solution, is that correct?

MR. COCHRANE: No, I think we are trying to point out here in the second to the last paragraph -- I will repeat it.

"The State of Indiana and much of industry, certainly Youngstown Sheet and Tube, is to determine what water uses are being affected and what causes the adverse effect."

MR. KLASSEN: Where are you reading?

MR. COCHRANE: Second to the last paragraph on Page 4.

That is in connection with the states, if you please.

MR. KLASSEN: In other words, I was incorrect in the interpretation that you are looking to the Government for the solution of your more difficult problems?

MR. COCHRANE: Correct.

MR. KLASSEN: This is what you inferred.

MR. COCHRANE: We think this should be solved in connection with both State and Federal cooperation.

MR. KLASSEN: That is in connection with --

MR. COCHRANE: Primarily the State of Indiana, our State, of course.

MR. KLASSEN: You are kind of evading my question here.

I am possibly not making myself clear.

You feel that --

MR. COCHRANE: Let me clear it up.

Insofar as, for instance, the Gary-Hobart Waterworks, we certainly worked through Mr. Poole of Indiana if it involved other state waters and probably Mr. Poole would work in connection with you.

MR. KLASSEN: I am getting back to the basic responsibility for solving your problem.

I personally feel that you create the problem, therefore, it is your responsibility to find the solution with whatever assistance you can get from Government but basically, the responsibility is yours.

Now, do you agree with this?

MR. COCHRANE: We think collectively we should work. That is, industry should work with our State officials in working out this cause and effect basis in which to control this problem.

MR. KLASSEN: I agree with that, you should work with the State agencies but I am coming back to where the prime responsibility rests for solving the problem.

MR. COCHRANE: I think I made it quite crystal clear that we will accept our role wherever it might be indicated.

MR. POSTON: Do you mean to say that you will clean up pollution when you find that it affects someone? Or you would wait until it affects someone before you would clean it up?

MR. COCHRANE: We are recommending that this approach should go a little further than what you suggest in your report.

We think this concept of determining what water quality uses are being affected and what causes the adverse affect is a proper approach.

MR. KLASSEN: In other words, you will wait until it is pointed out to you before you will do anything about it?

MR. COCHRANE: Not necessarily.

MR. KLASSEN: Well, then, what is your approach?

This is my understanding --

MR. COCHRANE: As I mentioned before, we're entering in a program at the Gary-Hobart Waterworks to determine the difficulties responsible for taste and odor and we expect to monitor, in connection with them and the State of Indiana officials here, the special ingredients that are causing this difficulty and if we are concerned with them, if they originate in our plant, we certainly will take the usual effort to correct them.

MR. KLASSEN: This is all right. You are a little ahead, you are on page 13 where I have some other notes, I will comment on that now.

This is, and if you will pardon me, I might be a little biased in my view on pollution but this is -- and you have used a couple of phrases here, "A program is scheduled, a program is planned---" this is a part of a well-known jargon that we very often get.

What I am wondering is when is this program going to be put into operation and why haven't you done this before? Why are you just planning this now?

Is it because someone called it to your attention?

MR. COCHRANE: I made it quite clear that our program at Youngstown Sheet and Tube has been a continuing program. I outlined in the report what progress would be made prior to this time, what progress we are making now, and what progress we are making in the future, particularly under the guidance of our State officials in Indiana.

MR. KLASSEN: There are several places in here that I have comments on.

One is on Page 8, talking about the 1964 Oil Recovery Facilities and on Page 9 on the breaking up of your oil emulsion which we recognize and know from our own experience is a very difficult problem. I would be interested, in a technical standpoint, as I mentioned yesterday, on the same comment and this would go for the second paragraph on Page 9, it is one thing to have facilities and I am not pointing my finger at you or the State of Indiana because we have the same experiences in the State of Illinois.

Recently, one of our industries, and this is what is discouraging to state agencies, when industries provide treatment facilities as you have here and then you go there and find that they are not being operated or are not being properly operated, and when asked why they are honest enough to say, "Well, you haven't been back."

Well, I would like to know what has been your experience in actual operation of the facilities you put in, particularly on oil removal and oil emulsion separation and removal?

Are you keeping all of the oil out of the water at the present time or is some of it getting away from your facilities?

MR. COCHRANE: I would say we are making a very strong attempt to remove the oil from the water both by -- as I have indicated here, by our program of, you might say, continuing expansion of putting in facilities to control this problem.

I think I outlined in one particular spot where we were installing another piece of equipment and it would take care of one-half of our present oil waste load in the plant.

MR. KLASSEN: I had a comment on this.

What happens to the other half of the oil waste load?

MR. COCHRANE: The other half we are still working on.

MR. KLASSEN: When can we expect it to be corrected?

MR. COCHRANE: We are working with our State officials on that at the present time.

We will expect to work this problem out with them in the future.

MR. KLASSEN: In other words, that's the answer to when?

To me, that isn't satisfactory. But, if this is what you want in the record -- I have stated this for 2 days. I only state this to our own industry, what I hope to get out of this conference with anybody, even in Illinois that is contributing pollution, what they are going to do, which you haven't told us, and when, which you haven't.

In other words, it is my understanding -- I just want it to be on the record - - that your answer to this, as far as I am concerned, is definitely not satisfactory because you haven't told us what you are going to do and when you are going to do it. But, if this is what you want on the record, this is up to you.

One other point -- on Page 10, under "Spent Acid", you leave the inference here, and it might be true, and I am asking you this from a technical standpoint because our operations of these haven't been too satisfactory, where you say the spent acid is dispersed over the slag and it is neutralized by the limestone in the slag, is this actually your experience, that the limestone in the slag will neutralize this acid?

We haven't been too successful in some of our operations because the limestone is soon coated and it becomes ineffective.

This seems to be a kind of a pot and pan method to me.

MR. COCHRANE: The answer to that is on Page 11, Mr. Klassen, the second paragraph.

MR. KLASSEN: Is this it?

You never indicated any material reaching the lake?

MR. COCHRANE: Correct.

MR. KLASSEN: Well, I don't want to get into a technical discussion with you here. We always use dyes but some dyes are -- the colors are immediately removed and you are not going to find them anyway.

You talk about and I -- this I am quite familiar with, having currently been the Chairman of the Engineering Committee of Ohio River Compact about this question of phenols, and I believe that it was your Company that was one of the ones that made a real contribution to the fact that phenols are not the sole indicators of taste and odors.

But, let's accept that. But if phenols are not the sole source of odor, do you know what some of the other sources of odor are?

Is your Company at the present time discharging any of these other materials into the water other than phenols that you know that will cause odor?

MR. COCHRANE: Yes, at the present time we are indicating in this program here that we are taking corrective measures.

MR. KLASSEN: On the bottom of Page 12, "A Program is scheduled."

This is a good word and it leaves the inference that you got something down on paper.

Can you give us a time or a schedule? This is all part of the schedule. Whenever you read schedule you expect to find a time indicator.

What is the time that you are going to eliminate the occasional releases from organics you mentioned in connection with coke quenching?

MR. COCHRANE: I believe we mentioned the program will be completed in 1966, the second paragraph, Page 13.

MR. KLASSEN: Also, just a passing comment on -- of course, this is a phrase that we often get, too, so my sympathies are with the State of Indiana, that there is a tendency to set up a straw man by saying that the water, in the canal, for example, Indiana Harbor Ship Canal shouldn't be the same as it is in the middle of Lake Michigan.

Has this actually been proposed or is this something that you set up for comparison?

Did anybody propose that the water in the Indiana Harbor Ship Canal should be the same as the water in Lake Michigan and if so, that this would require all of the industries to close down in Lake County?

MR. COCHRANE: It would be inferred that if we were to quit discharging pollutants in the canal, we infer that is what you want.

MR. KLASSEN: Has anybody ever indicated that the water in the Harbor Ship Canal should be the same as we find in the middle of Lake Michigan?

I am not pressing you, I just want to --

MR. COCHRANE: Strictly drawn by inference.

MR. KLASSEN: I am looking for information.

MR. COCHRANE: I say, it is strictly drawn by inferences.

MR. KLASSEN: This is what I wanted you to bring out. Because very often, inferences are pulled out of the report and made to look like waste control agencies are against industrial expansion, and it is quite the opposite.

We are trying to get you better water in industry and sometimes you make it a little difficult for us to do this.

One thing that really interested me and this is, I think, this might be the last question.

In the middle of page 16, I read this with you rather hurriedly, but in the middle, in line with this, are you suggesting in here that the waste from the Indiana Harbor Ship Canal area be diverted into Illinois without enough lake water to flush it into Illinois and dilute it?

I hope I am wrong, but is this what you are inferring?

MR. COCHRANE: This is not necessarily our proposal.

This has been suggested in the past and we thought --

MR. KLASSEN: By whom?

MR. COCHRANE: -- (continuing) it should be mentioned.

MR. KLASSEN: By whom?

MR. COCHRANE: I really can't give you the reference but it has been proposed.

MR. KLASSEN: This, obviously, is in your report here in the record. Is this something that your Company is advocating?

MR. COCHRANE: No, not necessarily. We think that this is just an item that the conferees may want to discuss among themselves and we thought it might be good to include it for discussion..

MR. KLASSEN: We sure will, thank you.

CHAIRMAN STEIN: Are there any more questions or comments?

MR. POSTON: I have a few comments I would like to make. I would like to read on Page 4 of your report, Mr. Cochrane.

"A concept of the State of Indiana and much of industry, certainly Youngstown Sheet and Tube, is to determine what water uses are being affected and what causes the adverse effect."

And I would point out to you that both

Congress and the President are very concerned about pollution that is affecting our waters right now and they have legislation and the President asked for stepped-up enforcement authority for the Federal Government.

He says that Federal Government must be able to prevent pollution before it occurs and before it happens right at the very source, rather than waiting until this pollution gets in the stream. I think if you adhere to your statement here we can expect greater Federal activity into the enforcement area.

I would like to ask you, Mr. Cochrane, whether or not you would give the Federal Government information on your discharges, the effluent characteristics, the pounds of material that you put into the waters?

MR. COCHRANE: I thought we answered that satisfactorily and beginning on page --

CHAIRMAN STEIN: I think he answered that.

As a matter of fact, Mr. Cochrane, the point is, one of the reasons to your objection is the misuse, which the Department has made of the data in the past.

Presumably, this misuse that you indicate has been the inclusion of data in official and public reports which certainly can be subject to rebuttal. Certainly, dealing in this area, what the Chicago water people seem to think was fairly satisfactory and they expressed their agreement with; certainly a report that the oil industries, when they made their statement yesterday, specific industries seemed to think it was satisfactory and correct according to them, but the point is that you feel that this, as I understand it, can be misuse.

I wonder what you would think of us if we didn't want to give data to the newspapers because we didn't like their editorials?

This is a rhetorical questions, I guess, I don't know.

MR. COCHRANE: I don't want to belabor this, I think you understand our position pretty well.

CHAIRMAN STEIN: While I have the floor, may I make one point?

You suggest that the diversion of the Grand Calumet, of the Chicago drainage system, should be provided with continuous withdrawl and that we should look into this and evaluate this in terms of the time schedule and in view of the experience that Chicago has had, getting another thousand cubic feet of -- I wonder if we can alleviate Mr. Gerstein's or expect to alleviate his problem within our lifetime if we employ this approach?

MR. KLASSEN: I took this as a compliment because we have some of the best legal talent in Illinois and New York on this and this hasn't been decided, so maybe we can.

MR. POSTON: I note further that you object to the terminology, "Population Equivalent," and I think you have misinterpreted our definition of "Population Equivalent."

We define it on the very first page of our report what we mean by "Population Equivalent" and that is defined as the discharge of one sixth pound of five day, 20 degree biochemical oxygen demand per day.

And I see that you have inferred that we haven't given a proper definition here. I can't understand your statement on Page 14.

MR. COCHRANE: Maybe this will help clarify it.

We very definitely think that the general public misinterprets that statement.

I can point out to you that two days ago one of the men standing on this podium made reference to the raw sewage equivalent of 4½ billion people dumped into Lake Michigan by industries and this probably is as good an example as I can give you.

MR. POSTON: We have some figures on Youngstown Sheet and Tube that were presented in our report, a population equivalent of 100,000 PE.

We have some 4,000 pounds of ammonia nitrogen and 6,000 total nitrogen pounds, phenolics 250, oil 18,900, 17,000 pounds of soluble iron from pickling.

Do you disagree with these figures?

MR. COCHRANE: No, we don't

MR. POSTON: All right. I think this in part is an answer to Mr. Klassen's question. These are some of the polluting substances that Youngstown is discharging here.

These are some of the things that we have concern for and things that we would like to eliminate from the water so that we can have clean water.

MR. COCHRANE: We recognize that concern, I should say this, too, that some of these figures might have to be corrected for -- that is, taken into consideration the receiving water in the Canal and that sort of thing which we brought out in our report.

I think we went to great length to show you we have recognized these problems. We have been working with the State of Indiana in the past, now and we will work with them in the future.

We take this thing very seriously and we are lending every effort to alleviate the condition.

MR. POSTON: I hope in time to come and in a short time, that we can revise these figures downward. I think this is very necessary, and I certainly hope that we can revise these figures down in time to come.

MR. COCHRANE: We can look forward to that. I wanted to add, so you notice, from Mr. Miller's report yesterday they show no increase in outflows of the Canal, Dickey Road Bridge in the last five years, and the water supply in Chicago is still safe and palatable according to Mr. Gerstein. When you realize that the vast increase in industrial output in the last 10 years or 15 years, the great increase in population, and to think that this situation has held at least stationary, I think it is quite a tribute to the work of the people in our area and to Mr. Poole for his extensive efforts in controlling the situation.

MR. POSTON: I note that Mr. Gerstein made some so-called goals for his waterworks intake, water that he wanted and I see in the papers this referred to the "pie in the sky."

I wonder how you feel about Mr. Gerstein's standards for his water intake?

MR. COCHRANE: I am really not in a position to answer that. I am not qualified to, but I am sure that when Mr. Poole and Mr. Miller get into this with Mr. Klassen and get into the work of the setting of standards we will be well represented.

MR. KLASSEN: I have one more question, Mr. Stein.

CHAIRMAN STEIN: Yes.

MR. KLASSEN: I think it is kind of an important one we kind of left dangling.

This Company is on record as not releasing information on their waste loadings. I would like to have Mr. Cochrane make a suggestion how the public then can know by what mechanism would we know how you are using or hopefully not misusing public waters?

Have you got any suggestions in that regard?

MR. COCHRANE: Well, as I said before, we work very closely with our State officials and when it seems appropriate and desirable on their part and our part, then we make information known.

You realize the general public, generally speaking, doesn't recognize the technical aspects of this problem.

CHAIRMAN STEIN: Mr. Cochrane, you mean to say because you are afraid the general public doesn't understand the technical aspects of a problem that you, as a Company policy, want to keep that information confidential?

MR. COCHRANE: If you wish to belabor this further, I have a statement here that our General Counsel sent to the Honorable George H. Fallon, Chairman of the Committee of Public Works, and I will be glad to quote from this if you like.

CHAIRMAN STEIN: I don't care.

MR. COCHRANE: It refers to the Mahoning Conference.

In the interest of saving time, I thought it might be repetitious.

CHAIRMAN STEIN: You can put it into the record as a quote.

MR. COCHRANE: All right, I shall do that and if you wish, I would present the letter to be included.

CHAIRMAN STEIN: If you wish.

MR. COCHRANE: "On behalf of my --"

CHAIRMAN STEIN: I have heard this before.

MR. COCHRANE: You have? Then shall I not?

CHAIRMAN STEIN: Go right ahead.

MR. KLASSEN: I haven't heard it.

MR. COCHRANE: "On behalf of my Company, I decline to make our effluent data available to the Department. To avoid any misunderstanding of my reasons, I would like to state them in this letter to you and to the Public Works Committee.

"Lest we be charged with being uncooperative, may I say that we have made available elaborate effluent data, as well as stream quality data, at frequent intervals to the Water Pollution Control Board and the Department of Health in Ohio, which has jurisdiction over our Company under the Ohio Water Pollution Control Law."

You understand this refers to the Mahoning Conference which has jurisdiction over our Company under the Ohio Pollution Control law.

Then, I will take the liberty of, in the interest of time, going to Page 2.

He said, "We regard the data as confidential both because of secret processes and because it contains information as to our volume of production in competitive lines."

He said further, "We are also particularly concerned over misuse what the Department has made of effluent data it has obtained on a voluntary basis in the past. It is the Department's standard practice to convert data it obtains on industrial organic discharges to what it calls Population Equivalent of sewage discharge. While both sewage and industrial organics have an oxygen demand on the river, it is wholly untrue that the industrial organics have any bacterial disease producing potential as does sewage.

"We feel very strongly that by portraying effluent data in this manner, representatives of the Department of Health, Education, and Welfare grossly misrepresent the facts and mislead the public."

CHAIRMAN STEIN: Thank you very much.

MR. KLASSEN: I just want to comment on that.

Maybe this is a conflict between an engineer not agreeing with the lawyer which very often happens.

There is one more point from Mr. Cochrane that I do want to mention here which strikes me as a kind of philosophy.

You state that the water in this area hasn't deteriorated in the last five years. This may be true. But I think five years ago it was bad and that the Chicago Water supply as Mr. Gerstein has mentioned has been safe for drinking during this period.

I want to point this out and emphasize this: The reason that the Chicago water is safe is because of the competency in the operation of the Chicago water supply, not because of the contributions made by your Company.

I want to ask you, must we wait until the Chicago water is unsafe before you do something?

Is this what you are waiting for?

MR. COCHRANE: I totally disagree with your statement because as I indicated in my report, we have made substantial programs and progress in waste control, as I have indicated in the report. You can refer back to it.

MR. CHESROW: Mr. Stein.

CHAIRMAN STEIN: Yes?

MR. CHESROW: Mr. Cochrane, on Page 8, you state that the discharge, referring to scale and trap oil -- "This discharge and the discharge from the larger terminal settling basin just described are the only two on the lakefront."

What is the total amount of oil in gallons per day that you are talking -- that you are referring to?

MR. COCHRANE: I really don't have the figures handy. They are in the report.

MR. CHESROW: Are you referring to the 18,900?

MR. COCHRANE: Whatever that figure was in the report. It will be cut in half according to our report.

MR. CHESROW: I must concur with Mr. Klassen, Mr. Poston, and Chairman Stein and thank you, Mr. Klassen, for taking Chicago into consideration as you always do.

We are very, very much concerned with the quality of safe drinking water and you say in your report on Page 2 that the citizens of the area do have safe drinking water.

Yes, Chicago does have safe drinking water, but at a price and to a great extent the capabilities of the men that are operating the water treatment plants.

Just one other question --

MR. COCHRANE: I quite agree with you on that point --

it is at a price, yes and a heavy price.

MR. CHESROW: It is at a price, yes, and a heavy price.

MR. COCHRANE: Yes, I would say, too, that we have -- the conferees will evaluate this economic problem considerably in their discussions which will lead to some recommendations.

There are other economic considerations which I am sure they will take into consideration.

MR. CHESROW: By the same token, you take the Department of Health, Education, and Welfare to task with reference to Population Equivalent and the industrial waste, as it is now set up; the BOD demand is a contributing factor and a factor that does have a lot to do with reference to the quality of our water.

Now, do you know of any other way we could figure the population demand?

MR. COCHRANE: I am sure there's -- I am not a technician in this field and I am sure there are enough people.

MR. CHESROW: I thought maybe you have another formula for a population figure.

MR. POSTON: Mr. Cochrane, I would like to -- you mentioned that the economics of this pollution problem.

I would like to think that the conferees will think not only of the economics but the health of the people and conservation of water. I think I brought this out at first and I think it is more than just the dollar. It is the health of the people that we are talking about here

MR. CHESROW: Thank you, Mr. Poston, again because those were the words of our Mayor Daley of Chicago in which he stressed very strongly that it is a question of economics also.

MR. COCHRANE: Well, I might remind you again that when we mentioned our concept and cetainly Youngstown Sheet & Tube is to make certain that there is a safe and palatable water supply.

CHAIRMAN STEIN: Are there any further comments or questions? If not, thank you very much, Mr. Cochrane.

You have been a very forbearing witness.

I would suggest that that entire letter that you have appear in the record so no one can say anything was taken out of context.

THE YOUNGSTOWN SHEET AND TUBE COMPANY
YOUNGSTOWN 1, OHIO

Robert F. Doolittle
Vice President and General Counsel

February 17, 1965

Hon. George H. Fallon
Chairman
Committee on Public Works
House of Representatives
Washington, D. C.

Dear Mr. Fallon:

I wish to urge your serious consideration of the subpoena power proposed to be given to the Secretary of Health, Education, and Welfare under Section 5 (e) (1) of H. R. 3988.

I have just come from the Conference on the Mahoning River conducted February 16 and 17, 1965 in Youngstown, Ohio, by the Secretary.

The HEW Conferee made repeated requests of industry representatives for submission to HEW of their effluent data. He argued that such data from individual companies and facilities in the reach of the stream at Youngstown, Ohio, was essential for an evaluation of water quality.

On behalf of my Company, I decline to make our effluent data available to the Department. To avoid any misunderstanding of my reasons, I would like to state them in this letter to you and to the Public Works Committee.

Lest we be charged with being uncooperative, may I say that we have made available elaborate effluent data, as well as stream quality data, at frequent intervals to the Water Pollution Control Board and the Department of Health in Ohio, which has jurisdiction over our Company under the Ohio Water Pollution Control Law.

We have done this in connection with an elaborate water pollution abatement program worked out with the state, which is functioning under regulations of the Ohio River Valley Water Sanitation Commission under an 8-state compact. In this connection we have developed and installed over the past several years extensive procedures and facilities for elimination and control of our discharges, at a cost to us of many millions of dollars.

Under Ohio law state authorities are prohibited from disclosing company data without the company's consent. This preserves a confidential relationship between the company and the state.

The Department of HEW, however, both by its actions and statements of intention has made it very clear that it would release the information to the public, and even broadcast it through publicity releases.

We regard the data as confidential both because of secret processes involved and because it contains information as to our volume of production in competitive lines.

We are also particularly concerned over misuse which the Department has made of effluent data it has obtained on a voluntary basis in the past. It is the Department's standard practice to convert data it obtains on industrial organic discharges to what it calls population quivalents of sewage discharge. While both sewage and industrial organics have an oxygen demand on the river, it is wholly untrue that the industrial organics have any bacterial disease producing potential as does sewage.

We feel very strongly that by portraying effluent data in this manner, representatives of the Department of HEW grossly misrepresent the facts and mislead the public.

Arming an administrative agency with the drastic power of subpoena in this kind of situation is both dangerous and unnecessary. Our people and our Congress throughout our history have been loathe to vest this inquisitorial power in administrative bodies except as a part of grand jury or court procedure.

Apart from these concerns, we feel strongly that the Department of HEW has no need for individual company data in order to discharge any of its duties under the Federal Water Pollution Control Act. Certainly it does not need this information for setting water quality standards. Nor does it need it for the conduct of Conferences.

The Secretary can call the Conference if he has reason to believe there is pollution occurring in a state other than that where the discharge occurs. This involves determination of the water quality in the receiving state, and not in the state of origin.

H. R. 3988 would recognize the primary responsibility of the states to prevent and control water pollution. The enforcement functioning of the Department of HEW is limited to taking action where the state or interstate body having jurisdiction is failing to make effective progress toward pollution abatement in the interstate water.

Once the Conference is called it is concerned with (1) the degree of pollution, if any, in the receiving state and its effect on health or welfare there, (2) whether there is in the originating state a sound program of control and effective progress being made thereunder toward abatement, and (3) causes of delay.

Not only is individual company data in the state of origin not needed, but even if obtained it would in no way determine water quality in the receiving state, in view of dilution and other self-purification occurring during passage downstream.

The Conference contemplated by the statute is one with the state agencies. We submit that the nature of their programs and the extent of progress being made under them, or lack of it, can very clearly be demonstrated by the states and industries involved. This can be done without any necessity whatever for the disclosure of any individual company data.

Effluent data is obviously designed to assess responsibility when downstream pollution is found, but responsibility is not an issue at Conference level.

I urge strongly against the amendment which would vest this subpoena power in the Department of HEW. I do so in the conviction that this extreme, inquisitorial power is susceptible to gross abuse. Further, it is clear that the Department has no need for individual company data in order to discharge its Conference responsibilities or to set water quality standards.

Of even greater concern, this power would enable the Department to compel production of highly competitive data on processing operations, production, scheduling of operations, and all manner of confidential business data which it does not need for stream analysis.

Respectfully submitted,
Robert F. Doolittle

RFD/mw

CHAIRMAN STEIN: Off the record

(Discussion off the record.)

CHAIRMAN STEIN: Back on the record.

Mr. Poole.

MR. POOLE: I have a man that I promised to get on an airplane at Noon. So, I am going to call on Dr. Allen D. Brandt, Manager of Industrial Health Engineering of the Bethlehem Steel Corporation.

DR. BRANDT: Mr. Chairman, Conferees, Ladies and Gentlemen:

In the interest of saving time, it appears now that we are taking more time than we should for these presentations.

I will read only a portion of mine if the Chairman will permit, and wish that the copies as distributed go into the record.

CHAIRMAN STEIN: Without objection, that will be done.

DR. BRANDT: My name is Allen Brandt. I am employed by Bethlehem Steel Corporation as manager of Industrial Health Engineering with headquarters in the home office at Bethlehem, Pennsylvania.

At the invitation of B. A. Poole, Technical Secretary of the Indiana Stream Pollution Control Board, I am here to describe briefly the Water Pollution Control facilities and program at the Burns Harbor plant of Bethlehem Steel Corporation.

The first phase of Bethlehem's Burns Harbor plant went into operation less than three months ago when last December the first plate was rolled on the 160 inch plate mill. Only two years earlier, on December 3, 1962, Mr. Arthur B. Homer, then Chairman of Bethlehem Steel Company, announced publicly Bethlehem's decision to build a steel plant at Burns Harbor. The plant is located in Porter County, Indiana on the southern shore of Lake Michigan and about 10 miles east of Gary, Indiana.

The plant's production facilities will be in the nature of rolling and finishing mills; specifically first, a 160 inch plate mill, now operating, second, a cold reduction and finishing mill scheduled for completion later this year and then third, an 80 inch hot strip mill.

Raw material in the form of slabs and coils will be supplied to the Burns Harbor plant from one or more of Bethlehem's integrated steel plants located in the East.

Waste Disposal:

Bethlehem retained a consulting engineering firm which was known to have had experience with steel mill waste treatment to design the water supply and waste water disposal facilities for the new plant.

Their engineers are experienced and especially competent in this area of engineering design, and are familiar with the area around the southern shore of Lake Michigan and with the pertinent regulations of the State of Indiana.

Bethlehem's engineers outlined the facilities to be installed at Burns Harbor and the consulting firm investigated similar installations at other steel plants to see how the wastes were being handled, what problems were being encountered and what changes that might be made to improve the facilities. The best available engineering knowledge and experience from all sources have been used to develop the disposal system for the Burns Harbor plant.

All concerned in the development of the system, and the type of equipment to be used and in the final design and layout of the entire waste handling and treatment system were closely working with the Indiana Health Department Engineers and especially with Mr. Poole, the Technical Secretary of the Indiana Stream Pollution Control Board.

All of the Health Department Engineers with whom we had contact were very helpful and cooperative. The Stream Pollution Control Board, in our opinion, was very demanding at times. We found out early the Board was pursuing diligently the objective set forth by its Technical Secretary on September 3, 1963.

Possibly those objectives deserve repeating at this time. They are:

1. Unreasonable pollution be abated as soon as possible.
2. New facilities to provide adequate treatment.
3. Existing industrial plants must provide adequate treatment facilities as part of the plant renovation or expansion.

Since ours is a new plant, only objective No. 2 is perinent in this discussion.

Bethlehem's Burns Harbor Plant waste handling and waste treatment system has been designed to allow the utmost flexibility in handling wastes with a view toward spotting and isolating as quickly as possible any problems that might arise. In general, the different waste waters receive primary treatment where they originate in the mill. They then are given secondary treatment at the central waste treatment plant, following which they flow to the terminal lagoon, then through a drainage ditch to the Little Calumet River.

A separate sewer system is being provided to handle the waste flows from each of the following four sources:

1. The Plate Mill.
2. The Cold Mill.
3. Pickling Operations.
4. Sanitary Facilities.

When 80 inch hot strip mill goes into operation, its waste waters will enter the plate mill sewer. In addition, a network of ditches drains the property and stormwater away.

All of the sewers drained to the west treatment plant located on about 10 acres of ground in the southwest corner of the property. Here the waste waters remain separated until after they have received secondary treatment, then they are combined and flow to the terminal lagoon which occupy an additional 78 acres the same general area of the plant property.

The lagoon is designed to handle all waste water from the plate mill, hot strip mill, cold strip mill, and sanitary sewage treatment plant, with a detention time of more than 24 hours.

It will accomplish cooling and reaeration and will serve as a double check against possible discharges of solids or oil into the Little Calumet River.

At this point, I would like to show some slides, sir, which show some of the equipment going in. Inasmuch as this is a new plant, much of this is under construction or has not been tried.

Nevertheless, we will show you some of the facilities.

Actually, this, I think, is not too necessary. It shows exactly where the Burns Plant is located.

This is an aerial view of the plant site taken about six months ago overlooking northeast.

For the record, I might point out that the area purchased by Bethlehem for the construction of the plant is roughly 10 times the figure sited by Mr. Le Bosquet on Tuesday of this week.

Next slide, please.

This is an aerial view of the waste treatment plant showing the general layout and control buildings. It is in the foreground, not the background. That is the operating plant.

Next slide, please.

This is an aerial view of the plate mill flocculator-clarifier at the pump station, the pump station being on the right.

Next slide, please.

This is the close-up aerial view of the four cold mill flocculators with again the control building on the right.

This is an aerial view of the 78 acre terminal lagoon.

Next, please.

This is a waste water pump station showing the five hot mill waste water pumps.

Next slide, please.

Three hot mill flocculators, looking east at the waste water pumping station which is in the background.

Next, please.

This is inside the control building showing the three cold mill filters.

Next slide, please.

Inside the control building again, but looking south at the waste pickle liquor neutralization process tanks at the left and the air compressors at the right.

Next, please.

The instrument panel board for both the hot and cold mill treatment units.

Next, please.

Instrumentation for waste pickle liquor neutralization pickle process; and the next and last slide, please.

The oil separation plant for the sheet and tin mill wastes.

Now, we will turn, for the benefit of the conferees who have a copy of this, turn to page 8, the conclusions.

The waste handling and treatment system and facilities at Bethlehem's Burns Harbor plant have been developed and laid out with great care.

The engineering design work was done by competent persons, there were consultations with State Health Department personnel, and approval of the Indiana Stream Pollution Control Board was obtained for each phase of the system and facilities as the overall design program progressed.

Incidentally, Bethlehem is grateful for, and values, the advice and assistance given unstintingly by the State Health Department engineers.

So far as I know, all changes in plans requested by the Health Department were made.

Consequently, it is our opinion that the facilities provided represent the latest know-how and equipment.

We have reason to believe that the waste treatment being provided will be more than adequate.

Should we encounter trouble spots as this new equipment, most of which still is untried, goes on stream, we still do the best we can to rectify the shortcomings to the end that, hopefully, we may meet all the requirements of the pertinent laws, and of even greater importance, not cause pollution of any of the waters of the States of Indiana or Illinois.

Thank you.

(Whereupon, the complete Statement by Allen D. Brandt was made a part of the record as follows:)

WATER POLLUTION CONTROL PROGRAM

BURNS HARBOR PLANT OF BETHLEHEM STEEL CORPORATION

Statement by Allen D. Brandt, Manager of Industrial Health Engineering, the Bethlehem Steel Corporation, Bethlehem, Pa.

Presented before: Grand Calumet Conference called by U. S. Department of Health, Education, and Welfare, Chicago, Illinois, March 2 - 4, 1965.

My name is Allen Brandt. I am employed by Bethlehem Steel Corporation as Manager of Industrial Health Engineering with headquarters in the home office at Bethlehem, Pennsylvania.

At the invitation of B. A. Poole, Technical Secretary of the Indiana Stream Pollution Control Board, I am here to describe briefly the water pollution control facilities and program at the Burns Harbor plant of Bethlehem Steel Corporation.

General

The first phase of Bethlehem's Burns Harbor plant went into operation less than three months ago when last December the first plate was rolled on the 160-inch plate mill. Only two years earlier, on December 3, 1962, Mr. Arthur B. Homer, then Chairman of Bethlehem Steel Company, announced publicly Bethlehem's decision to build a steel plant at Burns Harbor. The plant is located in Porter County, Indiana, on the southern shore of Lake Michigan and about 10 miles east of Gary, Indiana.

The plant's production facilities will be in the nature of rolling and finishing mills; specifically, (1) a 160-inch plate mill, now operating, (2) a cold reduction and finishing mill scheduled for completion later this year and then (3) an 80-inch hot strip mill.

Raw material in the form of slabs and coils will be supplied to the Burns Harbor plant from one or more of Bethlehem's integrated steel plants located in the East.

Waste Disposal

Bethlehem retained a consulting engineering firm which was known to have had experience with steel mill waste treatment to design the water supply and waste water disposal facilities for the new plant. Their engineers are experienced and especially competent in this area of engineering design, and are familiar with the area around the southern shore of Lake Michigan and with the pertinent regulations of the State of Indiana. Bethlehem engineers outlined the facilities to be installed at Burns Harbor and the consulting firm investigated similar installations at other steel plants to see how the wastes were being handled, what problems were being encountered and what changes might be made to improve the facilities. The best available engineering knowledge and experience from all sources has been used to develop the disposal system for the Burns Harbor plant.

All concerned in the development of the system, in the type of equipment to be used and in the final design and layout of the entire waste handling and treatment system worked closely with the Indiana Health Department engineers and especially with Mr. Poole, the Technical Secretary of the Indiana Stream Pollution Control Board.

All of the Health Department engineers with whom we had contact were very helpful and cooperative. The Stream Pollution Control Board, in our opinion, was very demanding at times. We found out early that the Board was pursuing diligently the objectives set forth by its technical secretary on September 3, 1963.

Possibly those objectives deserve repeating at this time. They are:

1. Unreasonable pollution be abated as soon as possible.
2. New facilities to provide adequate treatment.
3. Existing industrial plants must provide adequate treatment facilities as part of the plant renovation or expansion. (Since ours is a new plant, only objective No. 2 is pertinent in this discussion.)

Bethlehem's Burns Harbor plant waste handling and treatment system has been designed to allow the utmost flexibility in handling wastes with a view toward spotting and isolating as quickly as possible any problems that might arise. In general, the different waste waters receive primary treatment where they originate in the mill. They then are given secondary treatment at the central waste treatment plant following which they flow to the terminal lagoon, then through a drainage ditch to the

Little Calumet River.

A separate sewer system is being provided to handle the waste flows from each of the following four sources: (1) the plate mill, (2) the cold mill, (3) pickling operations and (4) sanitary facilities. When the 80-inch hot strip mill goes into operation, its waste waters will enter the plate mill sewer. In addition, a network of ditches drains the property and carries storm water away. All of the sewers drain to the waste treatment plant located on about ten acres of ground in the southwest corner of the property. Here the waste waters remain separated until after they have received secondary treatment, then they are combined and flow to the terminal lagoon which occupies an additional 78 acres in the same general area of the plant property.

The lagoon is designed to handle all waste water from the plate mill, hot strip mill, cold strip mill and sanitary sewage treatment plant, with a detention time of more than 24 hours. It will accomplish cooling and reaeration and will serve as a double check against possible discharges of solids or oil into the Little Calumet River.

Plate Mill

As stated earlier, the plate mill is the first facility to go into operation. It produces mill scale which is carried away by means of water from the surfaces of the steel being rolled. In addition, a small amount of the lubricating oils and grease finds its way into the waste water from the mill. Consequently, the water leaving the plate mill contains suspended solids in the form of iron scale and a small amount of oil and grease. The size of the particles varies from very large pieces of scale knocked off the steel slabs as they leave the reheat furnaces down to extremely small particles produced in the finishing stands of the plate mill.

The waste water is collected in a scale pit located at the plate mill. Here the large particles of scale are removed before the water is pumped via the plate mill sewer to the waste treatment plant. The scale pit is equipped with an oil skimmer to remove the floating oil. The oil so collected is pumped to a heated tank where some of the entrained water and other impurities are removed, following which it is hauled away by tank truck.

Facilities at the main treatment plant intended to remove mill scale and certain other suspended solids consist of three clarifier-flocculators. The influent flume to the clarifier-flocculators is equipped with an oil skimmer. The waste water in the clarifier-flocculators will be treated chemically so as to effect good removal of the fine suspended solids that are not removed in the scale pit. The sludge which collects in the tanks is dewatered by vacuum filters and may be either used as fill in the area or sold. The effluent flows to the terminal lagoon.

Cold Reduction and Finishing Mill

The cold reduction and finishing mill is under construction and is expected to go into operation later this year. Production facilities at the mill will include a continuous pickler, continuous cleaning and annealing lines, a tin line, cold reduction mills and allied facilities.

The continuous pickler will produce waste pickle liquor which will be handled separately from other mill wastes. A special pipeline will convey the spent pickle liquor to the waste treatment plant where it will be neutralized with lime using a hot oxidation process. The neutralized slurry will be discharged to the plate mill flocculator-clarifier for settling and removal of the solids.

A deep-well has been drilled and it is hoped that it may serve as a better disposal method for the spent pickle liquor than the neutralization equipment. Should that turn out to be the case, it is Bethlehem's intention to use the deep-well for such waste.

The waste from the continuous cleaning and annealing operations and the tin plating operation will contain a variety of materials, some alkaline and some acid, in small amounts. Some of these wastes will be given primary treatment close to their sources after which they and the others not given such primary treatment will be collected in a holding tank and discharged from it at a slow and uniform rate into the cold mill sewer.

Rolling oils from the cold reduction mills will be collected, separated and concentrated at an oil separation plant adjacent to the mill. The recovered oil will be recycled to the mill or removed by tank truck. The waste water will be discharged to the cold mill sewer.

All waste water discharged to the cold mill sewer will flow to the secondary waste treatment plant where it will be subjected to chemical coagulation, flocculation and sedimentation. An oil skimmer is provided at the treatment plant for the cold mill waste. Sludge collected in the tanks will be dewatered by vacuum filters and may be either used as fill in the area or sold. The effluent flows to the terminal lagoon.

Hot Strip Mill

The waste water from the 80-inch strip mill, to be constructed as the third phase of the present program, will have characteristics similar to that from the 160-inch plate mill. Therefore, it will be discharged to the same sewer and will be given the same treatment in the secondary plant as was described previously for the plate mill.

Sanitary Sewage Treatment

All sanitary sewage throughout the plant is collected in a separate sanitary sewer system and conveyed to a new sewage treatment plant adjacent to the industrial waste treatment facilities. It is a conventional activated sludge plant. Its design capacity was based on experience at the other steel plants both as to the volume rate of flow (350 Gpm at present) and as the probable loading. (For purposes of comparison, this sewage treatment plant is about the same size as one capable of serving a community of approximately 1200 homes.)

As and when the need arises, the sanitary sewage treatment plant will be expanded to a capacity of about 560 gpm. This can be done by adding another aeration tank and secondary clarifier. If further expansion ever becomes necessary, the plant can be converted to the contact stabilization process by the addition of one more aeration tank.

The existing sanitary sewage treatment plant consists of a comminutor for grinding solids, a primary settling tank, two aeration tanks, a secondary clarifier and chlorine contact tank. Two aerobic digesters are provided for handling excess sludge. The treated effluent is discharged to the terminal lagoon and is expected not to create a bacterial pollution problem anywhere.

Terminal Lagoon

The lagoon has a total volume capacity of approximately 120 million gallons. It will result in a detention time of 1.2 days. The surface area of the lagoon is about 78 acres. The lagoon will accomplish cooling and reaeration and is equipped with scum baffles and skimmers to prevent the discharge of any floating materials.

Conclusion

The waste handling and treatment system and facilities at Bethlehem's Burns Harbor plant have been developed and laid out with great care. The engineering design work was done by competent persons, there were consultations with State Health Department personnel, and approval of the Indiana Stream Pollution Control Board was obtained for each phase of the system and facilities as the overall design program progressed. Incidentally, Bethlehem is grateful for, and values, the advice and assistance given unstintingly by the State Health Department engineers. So far as I know all changes in plans requested by the Health Department were made.

Consequently, it is our opinion that the facilities provided will be more than adequate. Should we encounter trouble spots as this new equipment, most of which still is untried, goes on stream, we will do the best we can to rectify the shortcomings to the end that, hopefully, we may meet all the requirements of the pertinent laws, and of even greater importance, not cause pollution of any of the waters of the states of Indiana and Illinois.

* * *

CHAIRMAN STEIN: Thank you, Mr. Brandt, for a very comprehensive statement.

(Applause.)

Are there any comments or questions?

MR. KLASSEN: I don't have a question, I just wanted to make a comment, that this gives those of us in the water pollution control area encouragement, Mr. Brandt.

We know --

MR. BRANDT: Thank you.

MR. KLASSEN: -- it is an indication the job can be done and we appreciate this contribution.

MR. BRANDT: Thank you.

CHAIRMAN STEIN: Thank you, Mr. Brandt.

I suggest you may have given some of them the clue they lacked so much, not to mention the method of dealing with the States and if they would put up plants like you do with this type equipment.

MR. BRANDT: I would like to point out this is a new plant.

MR. KLASSEN: I think there was something significant if you deal this way with the State, you don't have to deal with the Federal Government.

MR. CHESROW: Congratulations.

CHAIRMAN STEIN: Mr. Poole.

MR. POOLE: If you indulge me one more, I will call on Ken Jackson of Midwest Steel, because he has a plane to catch.

Is Mr. Jackson in the room?

Mr. Jackson is general counsel for Midwest Steel, I neglected to add that.

MR. JACKSON: Mr. Chairman, conferees, ladies and gentlemen:

My name is Kenneth G. Jackson. I am an attorney residing in Pittsburgh, Pennsylvania, and represent National Steel Corporation in matters involving stream pollution, the treatment of industrial wastes and related problems.

I have for many years been associated with the Steel Industry Action Committee, which, as you gentlemen know, is a voluntary committee of representatives of the various steel producing and processing companies organized in the formative days of the Ohio River Valley Water Sanitation Commission to work with that Commission on pollution abatement problems.

I am here today to tell you about the waste water control and treatment facilities of Midwest Steel Division of National Steel Corporation, which is located in the town of Portage, in Porter County, Indiana, approximately eight miles east of Gary, Indiana.

Midwest is, in the parlance of the industry, a new finishing mill which was built on the southern shore of Lake Michigan. I will tell you more about this plant in connection with a series of slides which have been prepared for presentation in connection with this paper.

Midwest Steel is fundamentally different from an integrated steel plant in that the raw materials with which the Midwest operations begin are coils of hot rolled steel, whereas in an integrated plant, production commences with the making of the steel which requires the consumption of large quantities of coal, limestone, iron ore and scrap. Consequently, the water requirements and the subsequent water contaminants at Midwest are substantially less per ton of finished product than at an integrated mill.

For example, the Midwest finishing plant consists of a pickler, a tandem mill, an electrolytic tin line, a continuous galvanizing line, a continuous annealing line and other necessary equipment. Midwest's water requirements are approximately 5,000 gallons per ton of finished product. At an integrated steel plant, in addition to finishing operations, such as those found at Midwest, there are coke ovens, sintering plants, open hearths or basic oxygen plants, blooming mills and hot strip mills. The water requirements in a basic steel producing plant can amount to as much as 25,000 gallons per ton of finished steel. In either type plant the water is spoken of as being used, but is actually not consumed. For the most part, the water is used, treated and returned to the stream or other source from which it is drawn; in this case, Lake Michigan.

Not only are the water requirements for the finishing plant different from those of an integrated plant, but so also are the water contaminants. In addition to the contaminants and treatment processes at the Midwest finishing plant which are hereinafter discussed, an integrated steel plant is faced with many other and probably more serious treatment problems. The integrated plant must contend with phenols, chlorides, flue dust, roll scale, and others, depending upon the raw materials and the methods of processing at the particular plant. In many cases the concentration of these contaminants in the process water is small, but the quantities of water required to be handled in the manufacturing process and therefore required to be treated are enormous. For example, the large hot strip mill may require thirty to forty million gallons of water per day for scale removal alone.

The treatment problems faced by integrated steel plants are complicated by at least two important factors. First, most integrated plants in the United States were built before industry and government realized the importance of stream pollution control, and, second, most known methods of water treatment today are based on retention time. Stated simply, retention time means that the large quantities of water used in steel making must be held or stored for varying periods of time during the treatment process and therefore require large land areas for treatment facilities. In many instances such land is not available in the proximity of integrated steel plants, regardless of price.

In the older integrated plants the problem of economics is particularly difficult. By this I mean not only the cost of acquisition, installation and operation of the treatment equipment and facilities, but the practicality of adapting new treatment facilities to equipment in an old plant, the economic life of which is highly uncertain in light of the presently increasing pace of changes and improvements in the production and finishing processes in the steel industry. Such changes sometimes beget new problems in the area of water treatment which tax the ingenuity of our best engineers and scientists in their effort to arrive at a workable solution consonant with costs and construction and operating practicality if not feasibility.

For example, subsequent to the completion of the Midwest plant, one of the divisions of National Steel Corporation installed a 7 stand 80" strip mill at its plant in Michigan. In planning this strip mill the Corporation secured the best engineering advice available to the industry and drew upon its own extensive experience in high speed steel strip production. Armed with this advice and information it engineered and installed as a part of this mill what is believed to be the last word in mill scale recovery. Up to this time a 6 stand mill was as far as the industry had gone in this phase of steel production. However, an additional finishing stand was incorporated in this mill. When the mill was put into operation it was discovered that although the scale recovery system worked well for the first five stands, the iron oxide particles produced at the last two finishing stands, some of which were submicron in size, would not settle out in the conventional scale pits which had been installed and which were the most up to date in the industry. Therefore, although the treated water from this strip mill is free of mill scale as the industry has known that term up to the time of this new 80" strip mill, these tiny iron oxide particles simply will not settle out. They do not have any apparent adverse effect on the waters, but seem to reflect light, thereby producing a hitherto unknown and as yet unsolved problem in that they appear to color the water, yet actually do not do so. Fortunately, this reflection disappears within a short distance from the outfall. We are advised that one of the other steel companies, which is now building a new 80" strip mill, having from our experience been alerted to this problem, is taking steps to avoid it by separating, for separate handling, the water from the last two stands which produce these submicron particles. This we cannot do because the entire collection and treatment system for this new mill is so incorporated into the mill and its foundations that such separation is almost impossible.

As will appear from the following discussion of our treatment program at Midwest Steel, large areas of land are required for a relatively small finishing plant, using today's treatment practices. Transfer these same treatment practices, if you will, to an older, crowded, integrated steel plant and the problems become readily apparent. There appears today to be no ready answer to the problem of complete treatment of industry wastes at old integrated plants.

Now, the waste water control program at Midwest Steel's new finishing mill.

As suggested above, Midwest is a finishing mill. Hot rolled coils produced by another division of the Corporation are shipped to Midwest for further processing. This steel is first pickled at a continuous pickling line, using a solution of sulfuric acid, and then reduced in gauge by cold rolling on a 5-stand tandem mill. After cold working, the steel may also be applied either by continuous galvanizing or by electrolytic tinning, in accordance with customer requirements. Some of the steel is also worked in the tin temper mill to produce conventional tin plate. This mill is also used to reduce steel to very thin gauges.

National Steel Corporation, in constructing the new plant of its Midwest Steel Division, has accepted the financial and moral obligation of waste water control.

As soon as the decision to erect a new mill was made, a sampling program was initiated to evaluate the quality and availability of the water from Lake Michigan adjacent to the plant site.

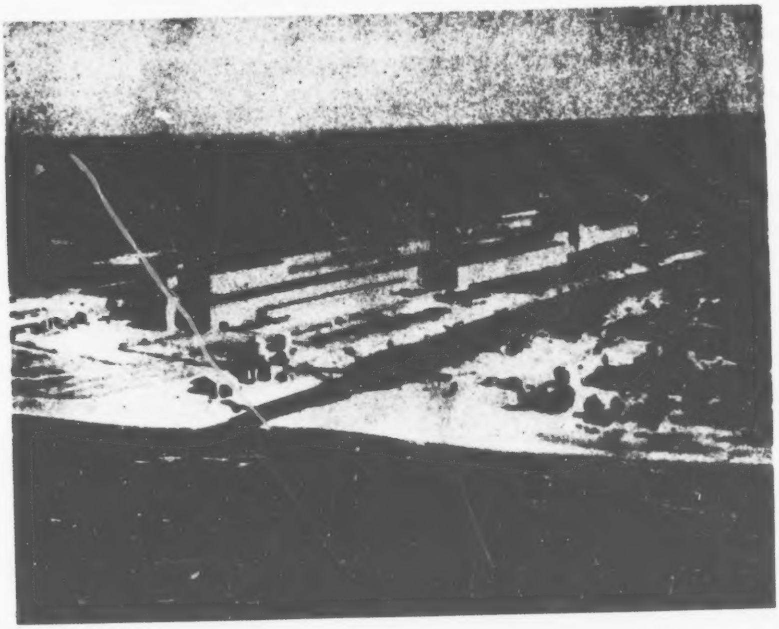
Local, State and Federal authorities were consulted early in the program and were continuously contacted and consulted as the program developed. Among these agencies and authorities were the County Zoning and Planning Board, the United States Corps of Engineers, the Indiana Conservation Department, the Indiana Flood Control and Water Resources Commission and the Indiana Stream Pollution Control Board. As you know, the Stream Pollution Control Board considers and deals with each potential water discharge on the case-by-case basis. This, of course, was done in the case of Midwest, and meetings were held regularly with members of the Board. Throughout the initial stages of planning and construction, Midwest kept that Board informed of contemplated mill operations, and secured advice and guidance from it in establishing a proper waste water control program.

Fortunately, sufficient land was available to permit the construction and operation of adequate control and treatment facilities. A very generous portion of the total acreage being used for the manufacturing processes has been allocated to waste treatment. At the present time at Midwest more than ten per cent of approximately 280 acres of land being utilized by the plant is devoted exclusively to waste treatment and disposal facilities.

In preparing the following parts of this statement I have drawn largely from the paper entitled "Waste Water Control at Midwest Steel's New Finishing Mill" which was delivered at the 17th Industrial Waste Conference at Purdue University on May 1, 1962, and to supplement my paper I am furnishing the conferees a copy of that document, marked Exhibit 1 -- unfortunately, it is not so marked -- which explains in somewhat more detail the story of the development and operation of the Midwest mill, including preconstruction planning for waste control and the various waste treatment facilities. In the interest of everyone, I will therefore not go into too much detail on these items.

(Text Continues on Page 1113)

WASTE WATER CONTROL



AT MIDWEST STEEL'S NEW FINISHING MILL

Presented at Purdue University
Seventeenth Industrial Waste Conference
May 1, 1962

By:

C. D. Hartman	Superintendent of Utilities, Midwest Steel Division, National Steel Corporation
F. E. Tucker	Supervisor Industrial Health Engineering, Research and Development, National Steel Corporation
P. D. Simmons	Industrial Health Engineer, Research and Development, National Steel Corporation
A. S. Toth	Principal Engineer, Hydrotechnic Corporation

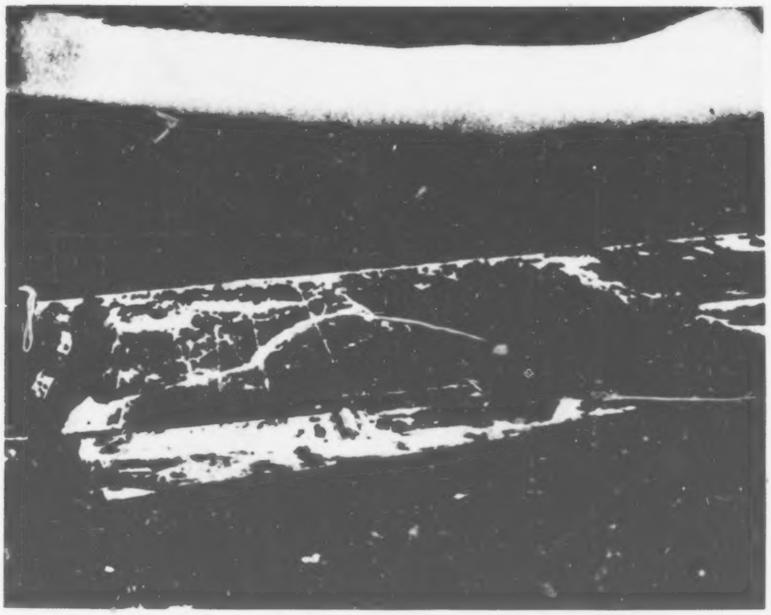


Figure 1

INTRODUCTION

Expansion in steel making and finishing capacity elsewhere in the world has been outstripping corresponding growth in the United States. While we are still able to maintain leadership in this major industry, the increasing number of new installations and the availability of low cost labor in other lands are threatening this position. Still other pressures are being exerted by domestic metal, glass, and plastic industries.

To fight back, steel is building new modern facilities and retiring old inefficient facilities. By speeding up production, automating certain operations, improving product quality and producing new marketable items, new plant construction is required. In nearly every such case, local authorities are requiring the installation of adequate waste control facilities to satisfy the increasing need for the protection of the water resources in the area. Steel plants, such as the plant of Midwest Steel, a division of National Steel, on the shore of Lake Michigan, are accepting the financial and moral obligation of waste water control while most foreign competitors do very little in their installations toward cleaning up industrial wastes discharges.

DEVELOPMENT AND OPERATION OF FINISHING MILL

The site of the new mill at the southernmost tip of Lake Michigan is adjacent to Burns Ditch, an artificial drainage channel, installed by court order in 1927. Figure 1 is a photograph of the unimproved site, an area within the belt of the Indiana sand dunes, which is now the object of special interest groups to conserve its natural beauty.

National Steel Corporation first acquired the land in 1929 and thirty years later, it was used for the construction of the Midwest finishing mill. Figure 2 shows the completed mill which produced galvanized steel as early as December 1960.

The finishing mill operations are identified in Figure 3 and may be referred to in tracing the travel of steel in the Midwest plant. Hot rolled coils produced by the new 80-inch hot strip mill at Great Lakes Steel, a sister division, near Detroit are shipped to Midwest. Steel is first pickled at the 80-inch continuous pickling line using a solution of sulfuric acid and then reduced in gage by cold rolling on the 5-stand tandem mill. Aftercold working, annealing and tempering of the strip may be required. For final finishing, a protective coating may be applied by continuous galvanizing or by electrolytic tinning. The tin temper mill normally used to toughen the surface of the steel, can also be used to reduce tin plate to very thin gauges.

PLANNING FOR WASTE WATER CONTROL

As soon as a public announcement was made of the new mill, a sampling program was initiated to evaluate the quality of the water adjacent to the plant site. The water survey was organized for examination of samples of water collected periodically at various points in Burns Ditch and in the lake. The survey information provided valuable data for selecting the location of the lake water supply intake, as well as establishing a reference for general water quality of the region before starting any mill construction.

Local, state and Federal authorites were consulted as early as possible to learn what regulations, or limitations, may have bearing upon the utilization of water by the mill. Among the government groups frequently consulted were the Porter County Zoning and Planning Board, the U. S. Corps of Engineers, the State of Indiana Conservation Department, Flood Control and Water Resources Commission and the Water Pollution Control Board. Indiana regulations and laws stipulate limits of permissible discharge of certain waste substances, which are known to be common to most domestic and industrial activities. In addition, the Water Pollution Control Board considers each potential waste water discharge on an individual case basis to determine what effect it may have on water quality in the general area or how it may influence any subsequent uses of the water. It was necessary to meet regularly with members of the Water Pollution Control Board, during the initial stages of planning to inform them of contemplated operations in the mill and to have guidance in establishing a proper waste water control program.

The mill and its personnel would produce many waste products eventually becoming waterborne which would require treatment before disposal. Sanitary sewage contributed by a mill population of 2,000 persons would involve control measures for biochemical oxygen demand, dissolved oxygen, suspended solids and floating material. Waste Water from mill operations would convey additive materials including pH depressants, suspended solids, floating and soluble oils, color inducing substances, iron, tin, zinc, chromium and fluoride. The concentrations of all of these would have to be controlled to within acceptable limits before releasing any water to Burns Ditch and it soon became evident that such control could not be provided effectively by one central facility treating all waste flows together no matter how appealing it might be for initial cost and ease of operation.

Each of the major contaminants had to be studied to determine what waste flows at the mill could be combined and conveyed together in an industrial waste sewer system for treatment and which waste flows had to be kept segregated for individual treatment. With this analysis completed, overall planning could begin by considering equalization of flow rates and of varying concentrations, the proper staging of step treatment, design criteria for treatment processes, the elimination of pumping trunk sewer flows and concentrating the waste water control facilities in as few sites as possible.

At this point, a preliminary engineering report and general plans outlining the waste water control facilities were prepared and submitted for consideration by the Water Pollution Control Board. The comments and suggestions of the Board representatives, Messrs. **Blucher** Poole, Robert Heider and Perry Miller, were helpful in establishing certain objectives of the waste water control program. Later, final designs were reviewed and approved by the Board before construction of anyfacility was started.

The general plan included as the first step, the separation of clean cooling water into the storm drainage system for direct discharge. Then all compatible flows collected in the industrial wastes sewer could be treated jointly at a chemical treatment plant. Caustic cleaning rinse water and dumps, pickling acid rinse water, most floor drain sump discharges, blowdowns and certain chemical treatment flows are combined, and in all, about twenty-five different streams are collected in the industrial wastes sewer. The remaining wastes flow are conveyed separately to the industrial wastes pretreatment area in three individual oily wastes streams, a chromium system, a fluoride system and a waste pickle liquor collection system.

Figure 4 shows the sites selected for the treatment facilities. The pretreatment area is located just east of the continuous annealing building. After proper pretreatment, the flows are discharged to the industrial wastes sewer, the oily wastes sewer or to sludge disposal pipelines. The oily wastes sewer terminates at the mixing tank of the chemical treatment plant and its flow is given final treatment here. Sludges are disposed of in holding lagoons. Sanitary sewage is pumped over to the west side of Burns Ditch to the sewage treatment plant. These facilities can be seen in relation to the steel mill buildings in photograph, Figure 5.

SEWAGE TREATMENT FACILITIES

Sewage is collected in a cement-lined cast iron pipe system and delivered to a pumping station at the east bank of Burns Ditch. The sewage is pumped in a force main over a utility bridge to the treatment plant shown in photograph, Figure 6.

The sewage treatment plant is designed to treat a flow of 330,000 gallons per day and can be expanded to handle 640,000 gpd. The treatment process incorporates the latest developments in activated sludge treatment and aerobic digestion of sludge. The final innocuous sludge is disposed of in the sludge lagoon. Figure 6a is a schematic representation of the sewage treatment process.

The process provides a reduction of 95 percent in BOD and 90 percent removal of suspended solids. The effluent is returned to Burns Ditch in a 24-inch outfall sewer. All flow before leaving the sewage treatment plant is disinfected by chlorination.

CHEMICAL TREATMENT PLANT

The chemical treatment plant is located along the east bank of Burns Ditch, approximately 1,000 feet from Lake Michigan. Figure 7 is a photograph showing the location of this waste water control facility. The chemical treatment plant provides final treatment by coagulation, flocculation and sedimentation for the various pretreatment plant effluents and the numerous flows collected by the industrial wastes sewers.

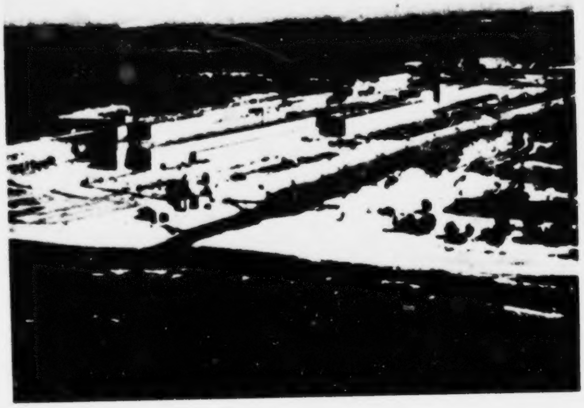


Figure 2

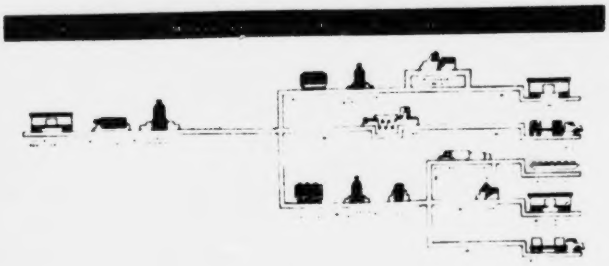
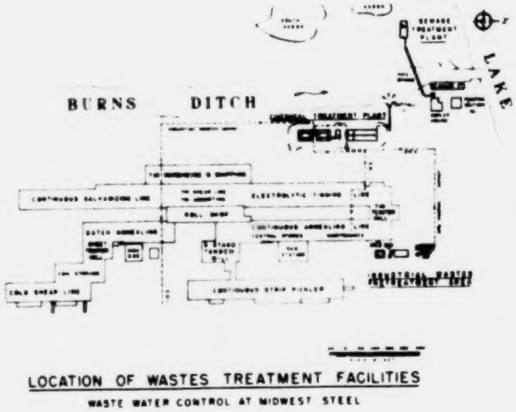


Figure 3



BURNS DITCH
LAKE
SEWAGE TREATMENT PLANT
CONTINUOUS GALVANIZING LINE
ELECTROLYTIC TINNING LINE
ROLL SHOP
CONTINUOUS ANNEALING LINE
BATCH ANNEALING
COLD SHEAR LINE
CONTINUOUS STRIP PICKLER
LOCATION OF WASTES TREATMENT FACILITIES
WASTE WATER CONTROL AT MIDWEST STEEL

Figure 4

Figure 5

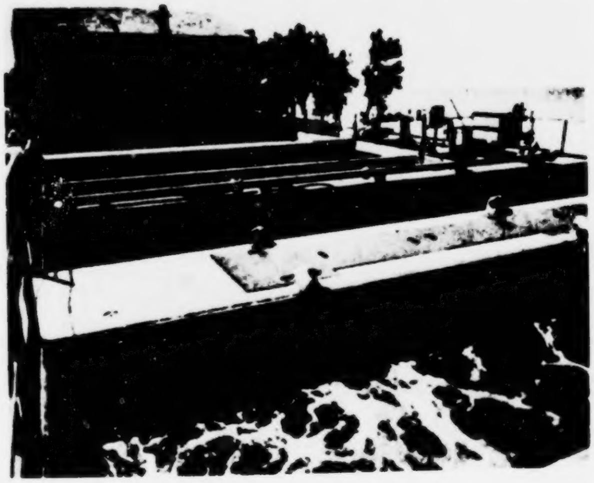
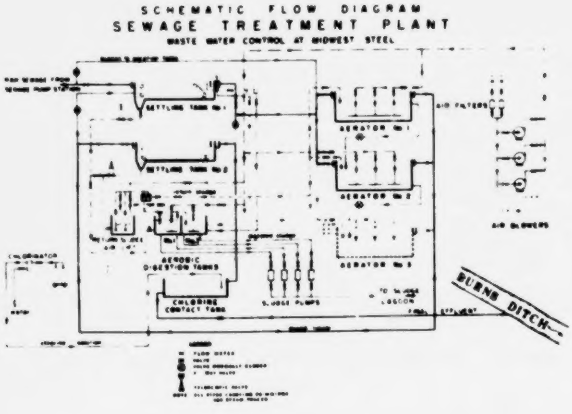


Figure 6



SCHEMATIC FLOW DIAGRAM
SEWAGE TREATMENT PLANT
WASTE WATER CONTROL AT MIDWEST STEEL
SETTLING TANK No. 1
SETTLING TANK No. 2
AERATOR No. 1
AERATOR No. 2
AERATOR No. 3
AIR FILTERS
AIR BLOWERS
AEROBIC DIGESTION TANKS
CHLORINE CONTACT TANK
SLUDGE PUMPS
CHLORINATOR
TO SLUDGE LAGOON
FINAL EFFLUENT
BURNS DITCH

Figure 6a

Figure 7a is a simplified diagram of the collection system for discharges from mill operations and from wastes pretreatment facilities and shows how these flows are clarified in the chemical treatment plant.

The hydraulics of the collection system and the flow through the treatment plant were carefully worked out to avoid the installation of a low-lift pumping station. In order to convey the flow by gravity to outfall No. 1 and Burns Ditch with sufficient head for discharge during periods of extreme high water caused by heavy runoff or by adverse lake conditions, it was necessary to construct the chemical treatment plant in a depression some ten to twelve feet below mill grade. By depressing the flowline, most of the treatment units had to be constructed below the water table and required subdrains to control uplift pressures whenever a treatment unit was being dewatered.

All flows, excepting the flow of the oily wastes sewer, discharge into equalization basins. Incoming flow is distributed in the basins and retained to equalize flow variations and to blend the different types of wastes. Since the dominant characteristic of the combined waste is acidic, the concrete-lined basins have a protective coating. Limestone backfill is also used around the effluent distribution channel in the basin. Diffused air keeps the wastes agitated and also helps to satisfy the oxygen demand exerted by the ferrous sulfate in acid rinse water from the pickling operation. Oil skimming is performed in a quiescent corner of the basin.

The flow leaving the equalization basins is mixed with the flow of the oily wastes sewer at the mixing tanks where chemicals are added for coagulation, and air, again is used to help agitate the flow. The two mixing tanks can be used in series, or individually. After mixing, the flow enters the final treatment units and is distributed across the flocculation sections of each tank.

Following a 20-minute minimum period of flocculation, the flow passes directly into the sedimentation area. Each sedimentation tank is equipped with a longitudinal sludge collecting mechanism, a cross collector and a sludge drawoff pipe leading to the wet wells of the sludge pumping station at the control building. Oil and scum are removed at the effluent end of the tank by a transverse pipe skimmer drained by gravity into a sump and then pumped to the oil separator tank for concentration. The treated plant effluent is measured by a Parshall flume before being discharged.

The average flow of the chemical treatment plant is approximately 4,000 gallons per minute and can be increased to 16,000 gpm as more mill facilities are added. The effluent from the chemical treatment plant is the main discharge from the finishing mill facilities.

Acid Neutralization

Acid neutralization is the first to be described of the different facilities shown in Figure 8, a photograph of the industrial wastes pretreatment area. The dominant acid to be neutralized is waste pickle liquor overflow from the continuous strip pickler. In addition to this flow, pickling tank dumps and chromic acid dumps from the electrolytic tinning line and from the continuous galvanizing line are directed to the acid neutralization plant.

The waste pickle liquor contains from 6 to 8 percent of sulfuric acid and approximately 16 percent of ferrous sulfate. The pH of waste pickle liquor is less than 1.0 and its temperature may be as high as 190° F when discharged from the continuous strip pickler. The daily volume of waste pickle liquor is approximately 45,000 gallons.

The waste pickle liquor from the continuous strip pickler is pumped from the mill area in a Saran-lined steel pipe to the industrial wastes pretreatment area. It first passes through a heat exchanger, as

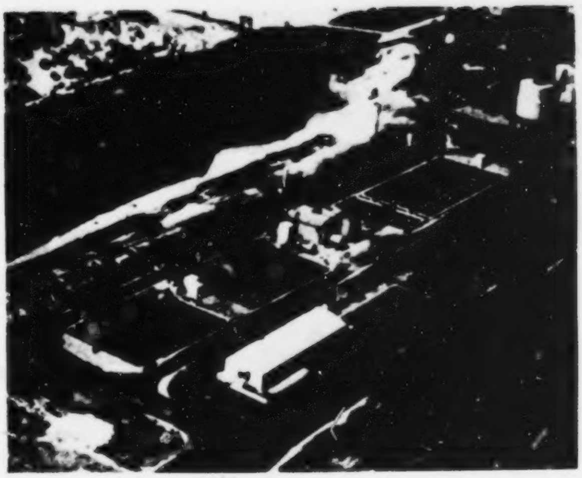


Figure 7

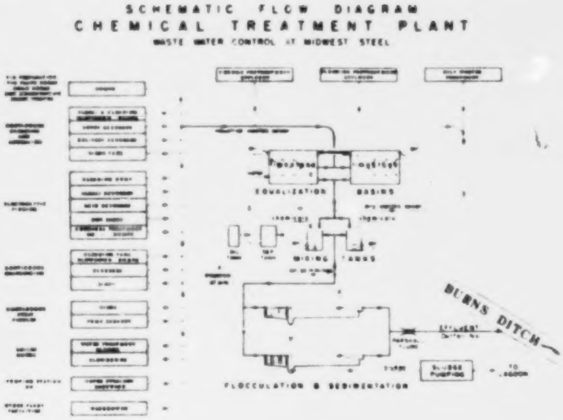

SCHEMATIC FLOW DIAGRAM
CHEMICAL TREATMENT PLANT
WASTE WATER CONTROL AT MIDWEST STEEL
EQUALIZATION
BASINS
MIXING
TANKS
BURNS DITCH
EFFLUENT
SLUDGE PUMPING
TO LAGOON
FLOCCULATION & SEDIMENTATION

Figure 7a

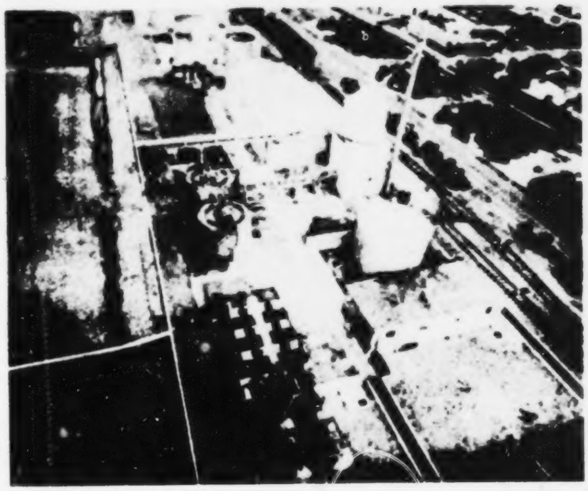


Figure 8

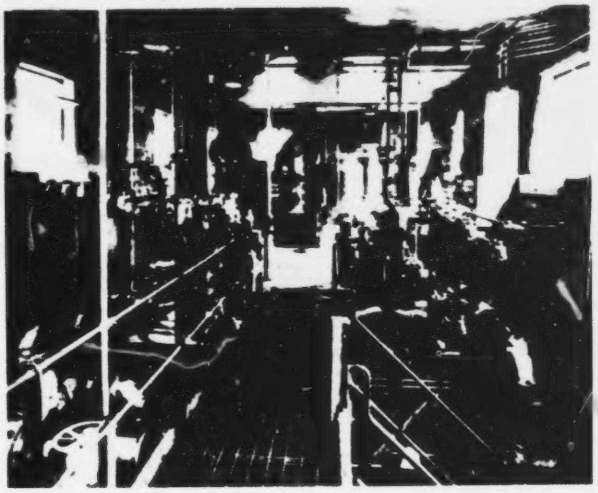


Figure 8a

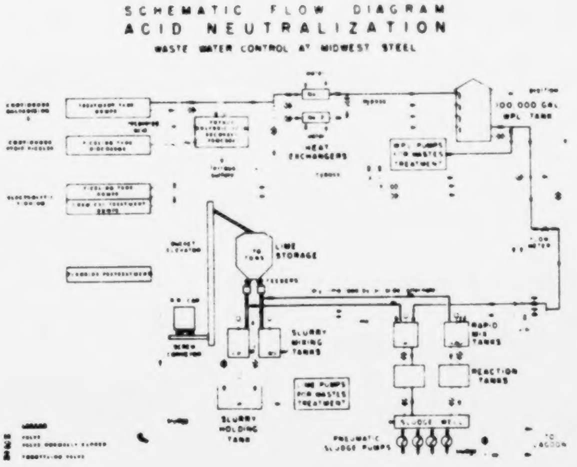

SCHEMATIC FLOW DIAGRAM
ACID NEUTRALIZATION
WASTE WATER CONTROL AT MIDWEST STEEL
HEAT EXCHANGERS
100 000 GAL WPL TANK
WPL PUMPS FOR WASTES TREATMENT
LIME STORAGE
FEEDERS
SLURRY MIXING TANKS
RAPID MIX TANKS
REACTION TANKS
LIME PUMPS FOR WASTES TREATMENT
SLURRY HOLDING TANK
SLUDGE WELL
PNEUMATIC SLUDGE PUMPS
TO LAGOON

Figure 8b

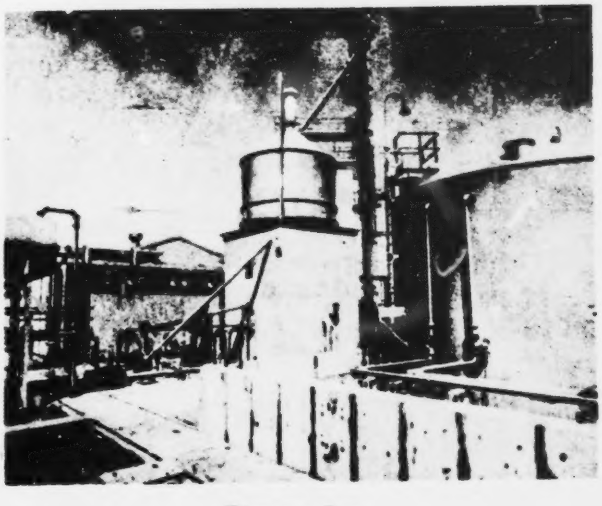


Figure 8c

shown in Figure 8a, to lower its temperature before undergoing neutralization in order to control the temperature rise from a subsequent heat of reaction. The cooled liquor passes to the holding tank which has a storage capacity of 100,000 gallons. Other waste acids from mill operations are pumped directly to the holding tank. The chromium in the chromic acid dumps is reduced by the waste pickle liquor in the holding tank and later precipitated during neutralization. Waste pickle liquor is also used for coagulating, chromium reduction, and demulsifying wastes in nearly every facility in the industrial wastes pretreatment area as well as in the chemical treatment plant.

Neutralization of waste pickle liquor is carried out at a constant rate of flow by means of a magnetic flow meter and a control valve. Byproduct lime from acetylene production is used as the neutralizing agent. Facilities are installed to feed lime either as a fine dry hydroxide powder, or as a lime slurry to the rapid mixing tanks. The rate of lime feed is adjusted by pH measurement of the effluent from the neutralization process. After the addition of lime, the liquor is held for a period of 30 minutes, or more, in a reaction tank before discharging to the wet well in the basement of the general operations building where air operated sludge pumps pump the neutralized sludge to the holding lagoons, The neutralization process may be followed on the flow diagram presented in Figure 8b,

A bucket elevator and screw conveyor unload the lime supply from the railroad cars to an over head lime storage bin having a capacity of 170 tons. Below the bin, two lime slurry mixer tanks and feed pumps are installed in the general operations building to provide lime slurry for other treatment processes in pretreatment area. The neutralization facilities are shown in photograph, Figure 8c.

OILY WASTES CONTROL

In the initial phase of steel finishing at Midwest, the 5-stand tandem mill and the operation of the tin temper mill for double-reduced tin plate, produce as great a variety of oily wastes as will be discharged by all mills ultimately installed. Therefore, some nominal capacity for each type of oily wastes control facility had to be built immediately. These facilities are located in the industrial wastes pretreatment area east of the continuous annealing building.

The 5-stand tandem mill is versatile and produces tin plate, galvanize sheets and mill clean back plate by cold working. When the mill is on tin plate or light gages of galvanize, a recirculation system is used to lubricate the strip and for cooling. The system recirculates a rolling solution of 10,000 gallons made up with about 1,000 gallons of oils with emulsifying and bactericidal agents added. By straining, cooling, conditioning and adding makeup to the solution, it may be reused for seven to ten days. When the solution is considered spent, it is dumped in a few minutes and a fresh solution of 10,000 gallons is substituted. Whenever the mill is on heavy gages of galvanize or mill clean black plate, some of the stands use the direct method of rolling. In this case, lubricant and water applied to the stand is used only once and discharged directly to sewer. The flow entering the sewer contains approximately 200 ppm of oils, and if all stands are on the direct method, the rate of flow may reach 6,000 gpm. The oils used may be of mineral, animal or vegetable origin, soluble or insoluble, and may be found in the waste water in different degrees of being free or emulsified and saponified or unsaponified.

The tin temper mill is operated in a manner similar to the 5-stand tandem mill whenever double-reduced tin plate is being produced. However, since only two stands are doing the work and reductions are only nominal, the rate and amount of oil and water use are much lower. The average flow is from 100 to 150 gpm, but it may have an oil content in the range of a thousand parts per million. The oils used for double-reduced tin plate are emulsified when applied and must be comparatively clean because of the thin gage metal.

In addition to the waste flows from mill operations, other oily wastes are generated by washdowns, fog eliminator sluicing and blowdowns. To cope with all of these variables in volume, in oil content, and in characteristics, it is necessary to provide control facilities of at least three general types. The wastes can be directed to the proper receiving unit as generated, and then can be processed progressively to obtain a lesser oil concentration in the larger volumes of water and a greater oil concentration in the smaller volumes of water. The three types of facilities are:

1. Oil Interception - for large water volumes with low oil content.
2. Oil Separation - for moderate water volumes or oil content.
3. Oil Concentration - for small volumes having high oil content.

At each type of control facility, chemicals, air or heat, are added to help separate the oils from the waste water. Descriptions of these facilities and flow diagrams explain how oily wastes are controlled.

Oil Interception

The waste discharge from the direct method of rolling is pumped from a skimming tank to the basement of the 5-stand tandem mill through a 24-inch steel force main to an equalization tank at the industrial wastes pretreatment area. Figure 9 shows the waste water control facilities at the oil interception plant.

The incoming flow is mixed in the equalization tank before passing to the mixing tank where it is joined with the treated water from the oil separation plant. At the mixing tank, waste pickle liquor may be added to lower the pH and assist in breaking oil emulsions prior to discharge to the interceptor tanks. Each oil interceptor tank has a volume of 66,000 gallons and provides a detention period of 20 minutes at its design flow of 3,300 gpm. Free oils, which float to the surface, are skimmed off at the effluent end of the tank and then pumped to the oil concentration plant. Solids settling to the bottom are removed from the tank by a sludge collector mechanism which deposits them into containers at plant grade. The treated flow is gauged and is discharged to the oily wastes sewer to be conveyed to the chemical treatment plant for a final step in treatment. The treatment process can be followed on the flow diagram, Figure 9a.

Oil Separation

The chemical flocculation and dissolved air flotation process for separating oils is suitable for handling the moderate continuous flow from the fog eliminator and tunnel sluicing, the waste rolling solution from double-reduced tin plate and the water drawoff from oil concentration. The treatment units housed at the north end of the general operations building near the oil interception facilities are shown in Figure 10.

All flows enter the primary holding tank where free oils and solids are separated. The oils are pumped to the oil concentration facilities and the solids to oil interception. The effluent from the primary tank contains emulsified oils which are treated with waste pickle liquor, lime, and air and then pumped to a retention tank to allow reactions and dissolution of air to be completed. The treated flow is released in the flotation tank where the coagulating chemicals form a floc and the entrained air under reduced pressure forms tiny air bubbles. The floc and bubbles sweep upward and carry suspended oils to the surface. The flotation tank is designed for an overflow rate of 2 gpm per square foot at a flow of 250 gpm. The clarified water is discharged to the oil interception tanks. Figure 10a presents the schematic flow diagram for oil separation.

Figure 9

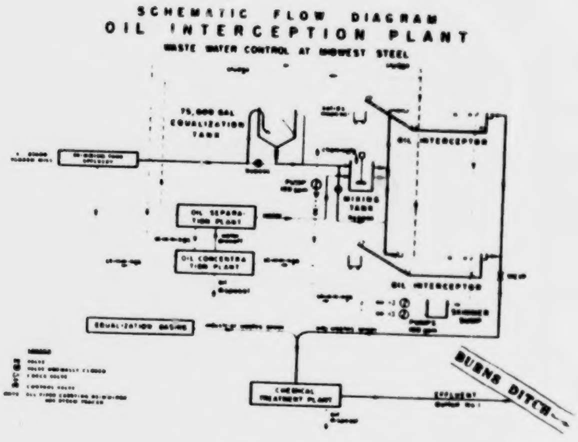

SCHEMATIC FLOW DIAGRAM
OIL INTERCEPTION PLANT
WASTE WATER CONTROL AT MIDWEST STEEL
75,000 GAL EQUALIZATION TANK
OIL SEPARATION PLANT
OIL CONCENTRATION PLANT
MIXING TANK
OIL INTERCEPTOR
OIL INTERCEPTOR
EQUALIZATION BASINS
CHEMICAL TREATMENT PLANT
EFFLUENT
BURNS DITCH

Figure 9a

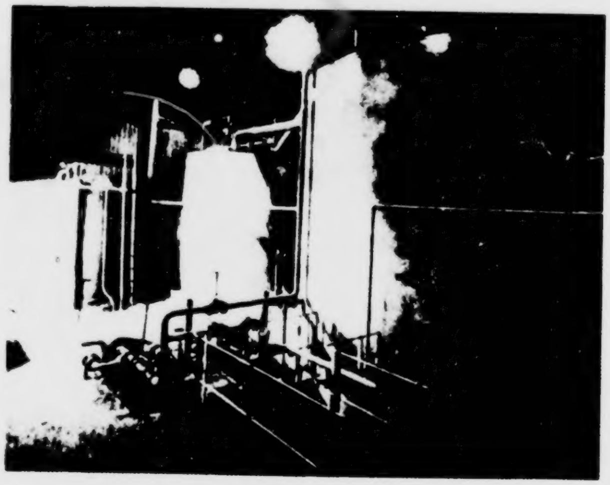


Figure 10

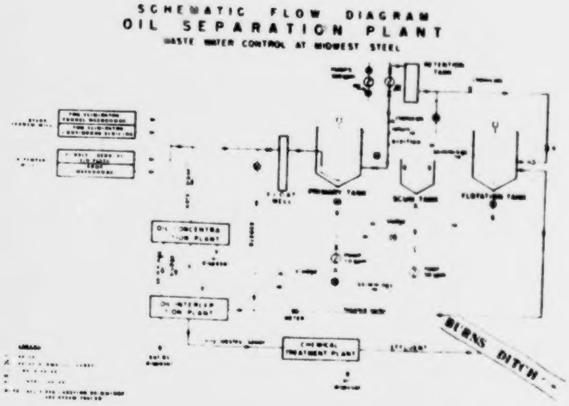

SCHEMATIC FLOW DIAGRAM
OIL SEPARATION PLANT
WASTE WATER CONTROL AT MIDWEST STEEL
RETENTION TANK
PRIMARY TANK
SCUM TANK
FLOTATION TANK
OIL CONCENTRATION PLANT
OIL INTERCEPTION PLANT
CHEMICAL TREATMENT PLANT
EFFLUENT
BURNS DITCH

Figure 10a

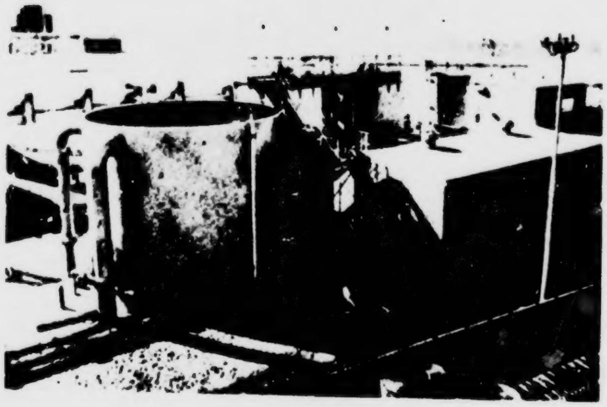


Figure 11

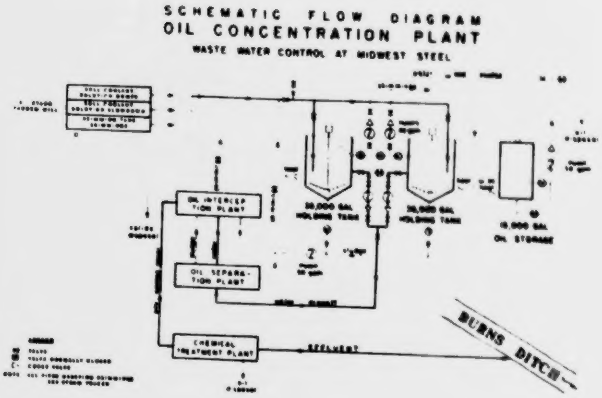

SCHEMATIC FLOW DIAGRAM
OIL CONCENTRATION PLANT
WASTE WATER CONTROL AT MIDWEST STEEL
OIL INTERCEPTION PLANT
30,000 GAL HOLDING TANK
30,000 GAL HOLDING TANK
10,000 GAL OIL STORAGE
OIL SEPARATION PLANT
CHEMICAL TREATMENT PLANT
EFFLUENT
BURNS DITCH

Figure 11a

Oil Concentration

Spent rolling solution, blowdowns, and similar wastes are pumped in a steam traced force main to an oil concentration tank. Heat is added to the insulated oil holding tank to separate water and concentrate the oil. The water from the holding tank is pumped to oil separation, the solids to oil interception and the oil to the oil storage tank. Further oil concentration occurs in the heated storage tank before final disposal of collected oil by trucking.

The oil concentration facilities are adjacent to the oil interceptor tanks and a small pump house as shown in Figure 11. Most of the oil, water and sludge pumps used in oily wastes control are installed in the small building. The transfer of these substances is outlined in Figure 11a for the oil concentration operation.

CHROMIUM WASTES CONTROL

The chromium wastes pretreatment facilities are located in the industrial wastes pretreatment area just to the east of the tin temper mill as shown in Figure 12. Chromium compounds, in the hexavalent form, are used for chemically treating finished product in the electrolytic tinning and galvanizing lines. After the strip leaves the chemical treatment unit, rinse waters are applied to clean the strip of excess material. These chrome-bearing rinse waters are treated by using waste pickle liquor to reduce chromium to the trivalent form which can readily be precipitated by adding lime.

The rinse waters are pumped from the operating lines to the two equalization tanks located above plant grade where inflow rates and variations in concentration are equalized. The flow leaving the equalization tanks is metered and then enters a mixing tank where waste pickle liquor is added. Approximately 30 minutes detention is provided in reaction tanks where mixing continues to permit the reduction process to be completed. The ferrous sulfate content of the waste pickle liquor acts as the reducing agent and the residual sulfuric acid of the liquor maintains an adequate level of pH to promote complete reduction. Complete reduction of hexavalent chromium is obtained when the reduction potential is held at 500 millivolts, as measured by an oxidation reduction potential meter, with a 10 percent excess of ferrous sulfate and a pH of about 2.5.

The treated flow enters an effluent sump where a lime feed connection may be used to apply lime to start neutralizing the waste and form insoluble precipitates, or simply for pH adjustment for sewer conditions. Final application of lime at the chemical treatment plant neutralizes the waste and completes the precipitation of chromium hydroxide and ferric hydroxide which are removed from the sedimentation basins and pumped to the sludge lagoons. The process is outlined in Figure 12a.

FLUORIDE WASTES CONTROL

The electrolytic tinning lines is the source of fluoride-bearing waste flows in the mill. The tin plating process used by Midwest is known as the "Halogen Line" in which a plating solution comprised of several reagents is used. Plating solution, which is a relatively expensive solution, contains stannous tin, fluorides, chlorides, and DuPont Agent No. 2.

The process involves several preparatory steps before the strip enters the first level bank of plater cells where its underside surface is tinned. The strip travels vertically to a second level of cells where the other side is tinned. At a third level, the strip enters a reclaim tank where plating solution is recovered and the strip is rinsed before leaving the tank.

A final water spray is used to remove small residual amounts of plating solution. The water used at the spray tank is reused at the plater fume exhauster washer which discharges a flow of 125 gpm to a pretreatment reservoir in the basement of the mill. From this point, the waste water is pumped to the fluoride

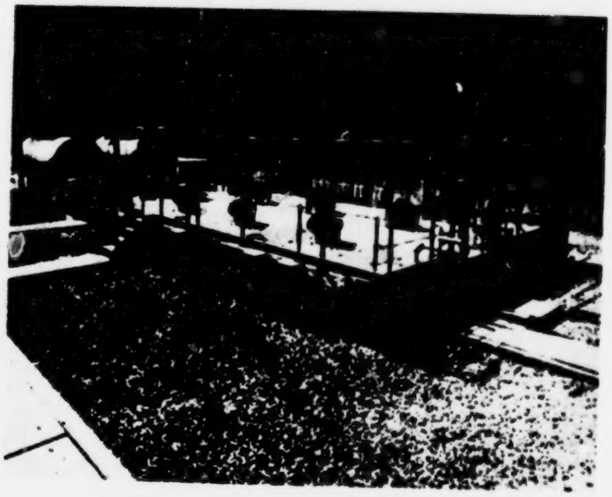


Figure 12

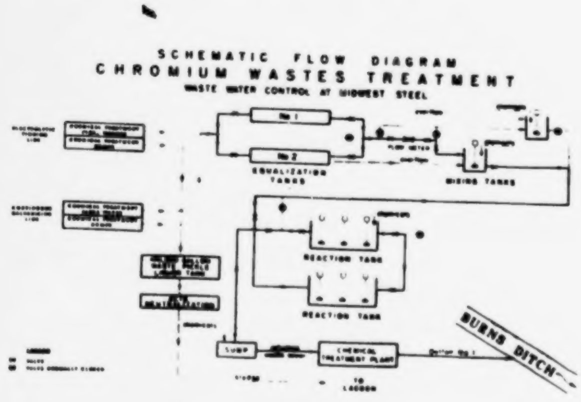

SCHEMATIC FLOW DIAGRAM
CHROMIUM WASTES TREATMENT
WASTE WATER CONTROL AT MIDWEST STEEL
No 1
No 2
EQUALIZATION TANKS
MIXING TANKS
REACTION TANK
REACTION TANK
SUMP
CHEMICAL TREATMENT PLANT
BURNS DITCH
TO LAGOON

Figure 12a

Figure 13

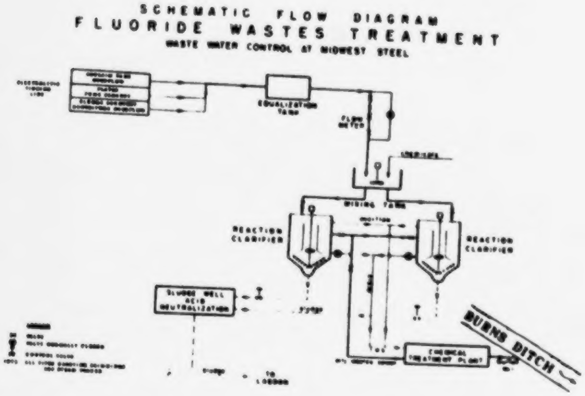

SCHEMATIC FLOW DIAGRAM
FLUORIDE WASTES TREATMENT
WASTE WATER CONTROL AT MIDWEST STEEL
EQUALIZATION TANK
FLOW METER
MIXING TANK
REACTION CLARIFIER
REACTION CLARIFIER
SLUDGE WELL ACID NEUTRALIZATION
CHEMICAL TREATMENT PLANT
BURNS DITCH
TO LAGOON

Figure 13a

wastes treatment plant.

The 125 gpm flow leaving the electrolytic tinning line contains small representative amounts of the plating solution, although the concentration of each contaminant will vary from time to time.

Since plating solution is valuable and contains high concentrations of substances of a critical nature to acceptable water quality, the mill was designed so that no possible discharge of solution to sewer could be made inadvertently. All plating solution sludges from periodic cleaning operations are collected, stored and processed in a sludge treating plant at the mill to extract all readily precipitable compounds for recovery, or disposal. Small quantities of centrifuge overflow are also directed to the fluoride wastes treatment plant for further treatment.

Facilities for treating fluoride wastes are shown in Figure 13. The flow is pumped from the sump at the mill to an elevated equalization tank where surges in flow and variations in chemical composition are moderated. When the flow leaves the equalization tank, it is metered before entering a mixing tank where measured amounts of lime and waste pickle liquor are added in proportion to the flow being delivered. The flow is subject to mixing, sludge recirculation, flocculation, settling and clarification in a circular reaction clarifier.

Lime is added in excess in the reaction clarifiers to drive the reaction between the lime and sodium bifluoride to completion within a reasonable period. The excess is also helpful in maintaining a ready supply of lime in contact with the waste to act as a buffer should feeding equipment fail to operate properly and to overcome any inaccuracies in feeding. Waste pickle liquor is added to form a gelatinous precipitate so as to coagulate the colloidal suspension of calcium fluoride formed in the treatment unit.

The reaction clarifier is an upflow type unit which maintains a layer of sludge in the lower section of the tank. Each unit is designed for a detention of two hours and 40 minutes and an overflow rate of 0.6 gpm per sq. ft. at a flow of 250 gpm. Clarified effluent is discharged to the oily wastes sewer. Sludge accumulation is controlled automatically by desludging measured volumes to the wet well in the acid neutralization plant. The process is outlined in the flow diagram presented on Figure 13a.

The small residual amounts of soluble compounds will be discharged in the effluent from the fluoride treatment plant. Among these are calcium fluoride, only slightly soluble in water, chlorides and some tin. The small amounts discharged are not in quantities which will develop concentrations in Burns Ditch above acceptable limits.

CONCLUSIONS

Industrial wastes treatment facilities, similar to those installed by Midwest Steel, are costly even in the case of a new plant which can incorporate in the original planning all necessary piping, pumping, and treating units. For an old established plant, equal facilities would cost substantially more, and in some cases of overcrowded plant conditions, would be very difficult to provide.

Of great assistance in planning new facilities is the willing participation of stream pollution control officials in providing guidance, review and suggestions concerning a waste water control program. Their helpful cooperation extends from the initial phases of planning through the final consummation of approved designs.

As for the industrial plant, the expenditure of monies for waste control can be repaid only in the form of good public relations which may engender greater sales of its products and in the satisfaction obtained from doing a good job in conserving an increasingly important natural resource, water supply.

And finally, only by proper monitoring of the final effluents can management be assured that its investment in facilities and good will is not being dissipated and that its objectives are being met.

General Engineering Design by: Hydrotechnic Corporation Consulting Engineers, New York, N.Y.

TREATMENT FACILITIES

The treatment of sanitary wastes at Midwest involves a mill population of approximately 2,000 employees, requiring measures for biochemical oxygen demand, dissolved oxygen, suspended solids and floating material. Industrial waste water from the mill operations includes pH depressants, suspended solids, floating and soluble oils, color inducing substances, iron, tin, zinc, chromium and chloride.

The treated water is returned to Lake Michigan through Burns Ditch, an artificial water course which had previously been constructed by public authorities to serve the drainage purposes of a large area to the south of the Midwest properties, and of course including the Midwest property.

SEWAGE TREATMENT FACILITIES

Sanitary wastes are collected and treated in a sewage system completely segregated from all other wastes and treatment at Midwest. This waste is collected and carried in a cement-lined cast iron pipe system and delivered to a pumping station on the east bank of the Burns Ditch. From here it is pumped in a force main across Burns Ditch to the sewage treatment plant which is designed to treat a flow of 330,000 gallons per day, which capacity could be approximately doubled if necessary. The treatment process incorporated the latest developments in activated sludge treatment and aerobic digestion of sludge. The treated sludge is disposed of in the sludge lagoon. The effluent water after disinfection by chlorination is returned to Burns Ditch in a 24" outfall.

CHEMICAL TREATMENT PLANT

The chemical treatment plant is located on the east bank of Burns Ditch. It provides final treatment by coagulation, flocculation and sedimentation for the various pretreatment plant effluents and the various flows collected by the industrial wastes sewers. The wastes are distributed in retaining basins to equalize flow variations and to blend the different wastes. Diffused air agitates the wastes and helps to satisfy the oxygen demand exerted by the ferrous sulfate in acid rinse waters from the pickling operations. Oil skimming is performed in a quiescent corner of the basin. After mixing, adding of chemicals for coagulation and aeration, the flow is directed to the final treatment units and distributed across the flocculation sections of each tank from whence it passes directly into the sedimentation area. The sedimentation tanks are equipped with sludge collecting mechanism and a sludge drawoff pipe leading to the wet wells of the sludge pumping station at the control building. Oil and scum are removed at the effluent end of the tank and drained by gravity into a sump, thence to the oil separator tank for concentration.

The average flow of the chemical treatment plant is approximately 4,000 gallons per minute, which can be increased about four-fold to accommodate possible future additional mill facilities.

OILY WASTES CONTROL

Due to the versatility of the 5-stand tandem mill a variety of oily wastes is produced calling for different treatments for the different types of wastes.

When the mill is producing tin plate or light gauges of galvanize the coolant oils are filtered, cooled and otherwise reconditioned and recirculated. When the mill is producing heavy gauges of galvanized or mill-cleaned black plate by the direct method of rolling, the lubricant and water is not recirculated but discharged directly to the collection sewer.

The operation of the tin mill is somewhat similar to that of the 5-stand tandem mill except that only two stands are doing the work and gauge reductions are only nominal. Consequently, the rate of flow and the amount of oil and water are smaller.

In addition to the waste flows from the mill operations, other oily wastes are generated by wash-downs, fog eliminator sluicing and blow-downs. Three types of facilities are used in the treatment of these wastes:

1. Oil interception - for large water volumes with low oil content.
2. Oil separation - for moderate water volumes or oil content.
3. Oil concentration - for small volumes having high oil content.

Each of these facilities and the operation thereof is more fully described in Exhibit 1 hereinabove referred to.

ACID NEUTRALIZATION

Most of the acid to be treated consists of waste pickle liquor from the continuous strip pickler. There is also acid from the pickling tank dumps and chromic acid dumps from the electrolytic tinning line and from the continuous galvanizing line.

Waste pickle liquor is pumped from the mill area in a Saran-lined steel pipe to the pretreatment area. On this journey it is cooled and deposited in a holding tank along with other waste acids from mill operations pumped directly to the tank. The pickle liquor reduces the chromium in the chromic acid which is later precipitated during neutralization. The waste pickle liquor is also used for coagulating and demulsifying wastes substantially throughout the pretreatment area as well as in the chemical treatment plant.

After addition of lime for neutralization the pickle liquor is held in a reaction tank and the sludge then discharged to the wet well pump from where it is delivered to the holding lagoons.

CHROMIUM WASTES CONTROL

Chromium wastes are produced in the electrolytic tinning and galvanizing lines. These chrome-bearing rinse waters are treated by the use of waste pickle liquor to reduce the chromium to the trivalent form which is then precipitated by the addition of lime. The rinse waters are pumped to equalization tanks, the flow from which is metered and directed to a mixing tank where waste pickle liquor is added. The flow thus treated enters an effluent sump where lime is fed in order to commence neutralization of the wastes or for a pH adjustment for sewer conditions. Final treatment occurs at the chemical treatment plant where chromium hydroxide and ferrous hydroxide are precipitated. The precipitates are then pumped to the sludge lagoons.

CHLORIDE WASTES CONTROL

The plating solutions at the electrolytic tinning lines contains stannous tin, fluorides, chlorides and DuPont Agent No. 2. Since this solution is relatively expensive, the strip, at the end of the plating process, is run through a reclaiming tank where as much of the solution as possible is recovered for reuse. The small residual amount of solution adhering to the plate is removed by final water spray. This spray is reused at the blast fume exhauster-washer from where it is discharged into a pretreatment reservoir in a sublevel of the mill. From this reservoir it is pumped to the fluoride waste treatment plant. The fluoride effluent from the plant is discharged to the oily waste sewer and the sludge is delivered by measured volumes to the acid neutralization plant.

The wastes treatment processes which I have briefly described hereinabove are as they existed until the recent past.

Now, we have had some recent changes in disposal and controls at Midwest as new as that plant may be.

We have found it necessary to make modifications in our treatment process to improve operations and performance of these facilities.

Consistent with its policy of keeping abreast of developments in the industry, consonant with treatment requirements and other factors which must be considered, Midwest has recently completed a deep well disposal facility which is now being used for disposal of waste pickle acid and chromate wastes.

Shortly after initial operation of the plant, it became obvious that the land used for waste lagoons in the neutralization of waste pickle acid was excessive. For this reason we initiated a research program to develop an improved method of waste acid disposal. We investigated the newer methods of neutralization which produced a relatively dry sludge. We also conducted an extensive program of investigation of acid recovery processes in the hope that we might discover a usable process, although this field of research has been thoroughly covered by the steel industry over the past many years.

In 1964 we undertook a feasibility study of deep well disposal for waste pickle acid. It was concluded from this study that the geology of the area at the Midwest plant site was peculiarly suitable for deep well disposal. The study indicated the presence of the Mt. Simon sandstone formation, which is approximately 2,000 feet thick, covered by adequate cap rock to render upward migration of the wastes improbable. There remained, however, the problem posed by the incompatibility of the connate water in the Mt. Simon formation with the waste pickle acid. This formation water contains approximately 6,000 to 7,000 ppm. calcium as calcium chloride which, as you know, when mixed with the waste pickle acid, precipitates calcium sulphate which would render the Mt. Simon formation much less desirable for further disposal. To overcome this we have injected a large predetermined quantity of fresh water into the disposal area around the well bore to serve as a buffer wall between the waste pickle acid and the connate water.

The feasibility study was furnished to the Indiana Stream Pollution Control Board with our request for a permit to complete the well and use it for the indicated purpose. This permit has been granted.

In delivering the acid waste to the disposal horizon it is delivered from the pickle line to a holding tank, filtered to remove all suspended solids above 5 microns in size, and then pumped by centrifugal pumps down to the horizon. The well was bottomed out at approximately 4,200 feet. The well diameter is 7" to the bottom and the injection tubing is introduced through the well bore into the disposal horizon for a distance of approximately 100 feet below the cap rock.

Notwithstanding the construction and operation of this deep well, the Indiana Stream Pollution Control Board has, as a condition to the grant of the permit for the well, required Midwest to maintain in stand-by readiness our complete acid neutralization facility referred to hereinabove.

Although we anticipate that the deep well will resolve land use problems associated with neutralization of waste acid, it has posed a new problem for Midwest in its chromate treatment facilities. We formerly used waste pickle acid for the treatment of chromates. The disposal of acid in the deep well necessitated the development of new treatment practices for chromates. After a thorough study of the problem we concluded that it would be possible to include the chromate wastes with the waste acid being disposed of through the deep well. These two solutions are chemically compatible and we think will not give rise to any additional problems in the disposal horizon. The deep well permit has been modified to include disposal of chromate wastes.

OIL RECOVERY - DOUBLE REDUCED TIN PLATE

A new development in the steel industry which occurred after the construction of our Midwest plant is the production of double reduced or thin reduced tin plate. In order to produce this product at Midwest Steel it was necessary to convert the tin temper mill which is a dry rolling mill to a solution rolling mill for the rolling of double reduced tin plate. A solution rolling mill uses a soluble oil. These emulsions are very difficult to break down and recover from waste effluents. For this reason Midwest installed a total recirculating system. When double reduced tin plate is reduced on the tin temper mill, all of the rolling solutions are recirculated through a system of filters for scale removal and reapplied to the rolling mill. When it becomes necessary to dump these solutions, they are removed for offsite disposal.

Now, I would like you to bear with me for a few moments while I show you a series of slides which I think are quite interesting and informative and will serve to clarify the foregoing part of this presentation.

This is Slide No. 1, which I have been advised that the time is short and I will therefore not go into any lengthy description of the slides.

Slide No. 1 is a picture that was taken approximately in July 1959, and is the unimproved plant site we referred to. As you look at this slide, east is to the right. The property fronts on the southerly side of Lake Michigan, looking north in viewing the slide. We see to the left what we have been discussing in this conference as Burns Ditch, which we all know is a drainage ditch serving the drainage purposes of a large area south of this tract which we view in this slide. Treated water from the Midwest operations is emptied into Burns Ditch, which, as can be seen here, empties into Lake Michigan.

Adjoining Burns Ditch on the westerly side, the company has additional property which extends to the limits of the City of Ogden Dunes. The sanitary waste treatment plant which treats all of the sanitary waste from Midwest Steel is located on this property.

No. 2, this picture was taken approximately August 1961. It is a general view of Midwest Steel plant, showing Burns Ditch and the northeasterly part of the lagoon area. Beginning at the lower right hand corner of this picture we see parts of two of the four waste lagoons. The structure across Burns Ditch is a foot bridge which also supports pipes leading to the lagoons and the waste sewage treatment plant. The small green building between Burns Ditch and the lagoons is the waste sewage treatment plant. The small square structure at the end of the bridge on the left side of the ditch is the sewage lift station. The excavated area in the center of this picture and parallel to the ditch is the uncompleted industrial waste water treatment plant which was then under construction, but which has since been completed. Approximately at the lake end of that excavation and at the edge of Burns Ditch is the outfall leading from the treatment plant where the treated water is discharged to the ditch and thence to the lake. At the extreme left of the main plant building is located the industrial waste primary treatment plant, which treats wastes such as oils, chromates, fluorides, waste pickle liquor and tin solutions. This part of the treatment facilities extends for some distance back of this building out of view and may be seen more clearly in a later slide.

Slide No. 3, this is an aerial view taken in the summer of 1963 approximately one year after operations commenced. The view is looking from north to south. Incidentally, this is a picture which was published in Factory Magazine for the "Factory of the Year Award" made to Midwest Steel in 1963.

Slide No. 4, this is a reproduction of a schematic drawing which shows the plant layout and the area of waste treatment facilities including a new deep well for acid disposal and the building housing the new tin sludge recovery and the new tin recovery processes.

Slide No. 5, the primary treatment plant may be seen at the left center of this slide.

Slide No. 6, in the center foreground is shown a more detailed picture of a portion of the treatment plant. As you may guess, this picture was taken from the top of the plant buildings. In somewhat better detail can be seen, beginning at the lower foreground, the chromium treatment plant. The waste is first pumped into the equalization tanks in the lower center portion of the picture. From these tanks there is a controlled flow into the retention basins where the chrome is mixed with waste pickle acid in the proper proportion to recipitate the chromates and then pumped to the waste lagoons for storage. The two tank-like structures in the center of the picture are fluoride treatment facilities. The structures to the left of that are the acid neutralization facilities.

Slide No. 7, this slide shows the secondary treatment plant. Equalization basins are at the lower left. The buildings in the center provide oil separation and chemical treatment. This is followed by the flocculation basin and final sedimentation basin. The fully treated effluent leaves the plant at the upper center of the slide and empties into Burns Ditch.

Slide No. 8, this shows the sewage treatment plant previously located. Since there was no muncipal sewage treatment plant available we were required by the Stream Pollution Control Board to construct this facility for treating sanitary waste.

Slide No. 9, shows the equalization tank and two flocculation tanks which are used for the chemical treatment of fluorides in plating solution waste.

Slide No. 10 shows the equalization tanks and the above-ground portion of the chrome treatment facilities. The greatest part is below ground. The reaction tanks which are a part of this treatment process are underground beneath the agitators.

Slide No. 11 shows the acid neutralization facility. In the center of the slide can be seen a lime storage silo and a lime slurry building. To the left of the lime slurry building, located underground, are the acid neutralization reaction basins. The tank located on the right is a waste pickle liquor storage tank.

Slide No. 12 shows an interior view of the acid pumping and control building.

Slide No. 13 shows a portion of the oil separation facility, comprising the oil equalization tank on the left, the two vertical tanks or oil concentrators, and the reclaimed oil storage tank. The building located in the lower righthand corner contains the oil pumping and control facilities.

Slide No. 14, shows the oil interceptors and sludge draw-off equipment particularly necessary in the primary treatment of wastes containing relatively low oil concentration.

Slide No. 15 shows three of the concentrating tanks which are a part of the oil separation plant.

Slide No. 16. This is an exterior view of the Centrifuge Building. The centrifuge is used to recover the sludge from the Fluoride Treatment Plant. This sludge would otherwise be pumped to the lagoons.

Slide No. 17 shows our Deep Well Disposal building. This well, 4,308 feet deep, will be used to dispose of our waste pickle acid and a portion of our chromic wastes.

* * * * * * * * *

CONCLUSION

Consistent with its policy, Midwest Steel will continue to look to the future to keep abreast of developments in the area of wastes treatment and controls. When we planned and constructed our present plant with its treatment facilities, as was noted hereinabove, we attempted to make provision for future increase in capacity and production. We must, of course, also bear in mind the overriding necessity for keeping abreast of steel production and processing developments in the industry. We have done the best we know how to anticipate all of these possible future problems but have no way of knowing whether our guesses have been good or bad. So far, they appear to have been good but in either event we have done our best.

We would like to take advantage of this opportunity particularly to thank the Indiana Stream Pollution Control Board and its Technical Secretary, Mr. Poole, for the continuous help and cooperation which they have rendered to us in coping with the many problems which so far we have, with their help, been able to solve. At times we have recoiled somewhat at their strict requirements but we realize that all of their efforts, and we hope they realize that all of our efforts, are in the interest of achieving a mutually desirous end.

Thank you, gentlemen.

CHAIRMAN STEIN: Thank you, Mr. Jackson.

This just isn't professional courtesy, I want to thank you for a very thorough and comprehensive and interesting statement of the work that is done at Midwest.

Are there any comments or questions?

MR. CHESROW: I want to point out that Mr. Jackson just illustrated the high degree of waste control and disposal that can be achieved by industry.

Congratulations.

MR. JACKSON: Thank you.

MR. POSTON: I would like to comment on or ask a question about page 16, the next to the last paragraph. It says, "When it becomes necessary to dump these solutions, they are removed for offsite disposal."

I wondered whether there was any supervision on this disposal site or what is it?

MR. JACKSON: This is done through an independent contractor and we have his assurances that it is disposed of in such a manner as not possibly to interfere with the waters.

MR. POSTON: The reason I ask this is I know in the past there have been itinerant septic tank cleaners who pump out a septic tank and rush it to the nearest stream and dump this material in the stream.

MR. JACKSON: That, of course, we have guarded against. No question about that.

MR. POSTON: I am glad to hear that.

MR. POOLE: For Mr. Poston's information, we license septic tank cleaners in Indiana because of that. That is one of the most momentous endeavors.

CHAIRMAN STEIN: Glad to hear that. I know Jackson and Fred Tucker wouldn't deal with an itinerant, either.

Thank you.

MR. JACKSON: Thank you.

MR. POOLE: Next, I am going to call on Inland Steel who will be represented by Mr. Ross Harbaugh, Assistant to the Operating Vice-President.

Mr. Harbaugh.

MR. HARBAUGH: Mr. Chairman and gentlemen of the Conference:

I am Ross Harbaugh, Assistant to the Vice-President, Manufacturing and Research, Inland Steel Company. I represent my company in response to a letter dated December 29, 1964 from Mr. Poole of the Indiana Stream

Pollution Control Board, in which Inland was designated as one of the industrial participants in this conference. We appreciate this opportunity to state Inland's policy and to present our views on this important matter.

Inland personnel have been interested and active in water and waste treatment for many years and for many reasons. For the past twelve years, I have been Inland's representative on the Steel Industry Action Committee, advisory to the Ohio River Valley Water Sanitation Commission. In 1961, at the start of the Great Lakes-Illinois River Basins Project, I was designated the industry representative for steel on the Technical Committee to that Project. As you know, both of these committees are still active.

Inland Steel Company was named a participant in this conference because of the location of its Indiana Harbor Works. This plant, which is the third largest steel plant in the United States, is situated adjacent to the Indiana Harbor Ship Canal, and occupies a man-made peninsula jutting into the lake to the east of the mouth of the canal.

INLAND'S STAKE IN CLEAN WATER

Immediately to the east of the Harbor Works is the East Chicago Water Department treatment plant and pumping station, with a water intake located in close proximity to the end of the peninsula. Also adjacent to the eastern boundary of Inland's plant is the East Chicago city park, marina and beach. The 57,000 residents of East Chicago depend on this water supply for domestic use and for recreation. Our 21,500 employees drink and bathe in this water. Inland, therefore, has a vital interest in protecting the quality of this water and, as I will recount, has a record of accomplishment in doing so.

The Indiana Harbor Works is a fully integrated steel plant. Its operations include coke plants, sintering plants, blast furnaces, open hearths, hot and cold rolling mills, and tinning and galvanizing plants. Supporting these manufacturing operations are three major power plants generating most of the needed electrical energy, shops of various kinds, storage facilities for millions of tons of raw materials, some 200 miles of railroad trackage, lake shipping docks, and other facilities which are vital to such a large operation. Ingot steel production last year was approximately 6,500,000 tons.

Inland's plant is one of seven large steel plants in the Chicago Steelmaking district, which pours more steel than any other district in the United States. Steel production in the geographical area covered by this conference is about 20% of the national total, or about 24 million tons a year. Only four nations of the world produce more steel than the Chicago steelmaking District.

The uses for water in this plant are many and varied. Water for drinking is piped throughout the plant from the East Chicago municipal system. For the largest use, cooling water, simple screening to keep fish out of the system is sufficient treatment. For other uses, as for example in the final processing of tin plate, deionized or distilled water is required.

When the present plant expansion program is completed in 1966, the total amount of water used will approximate that of the City of Chicago, or about one billion gallons a day.

Almost all water discharged from the Inland Steel plant enters the Indiana Harbor Ship canal and ship-turning basin, which is part of the Grand Calumet River-Indiana Harbor Ship canal drainage system, extending from about Columbia Avenue in Hammond to the northeast section of Gary.

Virtually all land along the ship canal is industrial property, and the land bordering this portion of the Grand Calumet is also given over mainly to industrial use or to municipal sewage plants. The dry weather flow in this system is comprised largely of municipal sewage plant effluents and industrial waste water discharge. Ship and barge transportation is virtually the only other water use.

SANITARY SEWAGE DISPOSAL

The February 1965 report on Illinois-Indiana pollution prepared by the U. S. Public Health Service reviews in considerable detail the problem of bacterial pollution. The press has carried a number of stories in which sewage was mentioned prominently. It is appropriate that this discussion of Inland's effort in the protection of water quality start with a review of the treatment given sanitary sewage.

In the late 1940's, Inland elected to treat such wastes generated in the Indiana Harbor Works rather than discharge all wastes into the city sewer system. The first part of what is now a 22-mile system of separate sanitary sewers was installed at that time, along with a treatment plant. In an expansion program ten years later, a second sewage plant was built, and is now being enlarged. In anticipation of future plant expansion, a third sanitary treatment plant has been approved by the Indiana Stream Pollution Control Board and is now under construction.

The design, construction and operation of these three sewage treatment plants has been approved by Indiana authorities, who receive periodic laboratory reports of their operation. The final effluent from each of these plants is chlorinated. As an additional safeguard, all industrial sewer outfalls are checked regularly for B. Coli count, in order to detect any accidental cross connections between the sanitary and industrial sewer systems.

We are confident that this phase of the pollution problem is under control at Inland, and that it will remain so.

INDUSTRIAL WASTE TREATMENT

Our approach to sanitary sewage disposal may be used as an example of what can be accomplished: (1) when the problem is recognized; (2) when goals are clearly defined; and (3) when knowledge of treatment method is available.

In the field of industrial waste treatment, however, the situation is considerably different, and one or more of these three requisites is missing in many cases.

The industrial water treatment problem as outlined in the February PHS report presents several examples where these three conditions are not present.

For example, the concept of damage to Lake Michigan waters by discharge of nutrients is new, and has not heretofore been recognized as a problem. This general term, as we understand it, refers to nitrogen compounds, phosphorus compounds, and perhaps to undefined organic matter which would be included in Population Equivalent.

In another example, although phenols have been recognized as a problem in a general way, goals have not been estblished, and effects upon water quality at the point of use are only now being correlated with amounts at the point of discharge.

The discharge of cyanide falls into a similar category. In the more than half century that blast furnaces and coke plants have been operated in the Calumet area, I can recall no mention of a resulting cyanide problem. If this is a problem which should be recognized, obviously we must establish a goal, and take steps to reach it.

Much more work remains to be done in this area, and the Indiana Stream Pollution Control Board and the Public Health Service are to be complimented for the excellent start they have made. I emphasize that it is only a start. It is not enough to say only that our waters must be kept clean or pure or unchanged. Mankind uses water for a purpose. That use, whether by man individually or by man in industry, almost always changes the water. Whether or not that change constitutes pollution requires thought and study, and a weighing of the many factors that must be considered in deciding upon a reasonable solution.

Referring again to the February report by the

PHS, the Inland data in the table on page 20, is at least in part, based on information freely given by Inland to representatives of the Indiana Stream Pollution Control Board and U.S. Public Health Service on August 8, 1962.

Since that time, certain improvements have been made. We are happy to say that BOD values from which the Population Equivalent of 200,000 was calculated have been reduced from 8.4 ppm to an average of 5.4 ppm for 1963 and 4.2 ppm for 1964. The dissolved oxygen for 1964 was 8 ppm.

If I may digress for a moment, I would like to comment on the use of the term Population Equivalent -- or PE. I recognize that this is a useful tool for the sanitary engineer, who must design his disposal plant to meet the oxygen demand coming to it, from whatever the source. I question the use of this term in the present case. The press and the public, naturally, are led to equate PE to human sewage, which, in this case, is clearly erroneous.

A reduction has also been made in the ammonia nitrogen loading. Recovery practices at our Plant 3 Coke Plant have been improved to capture some 2,600 pounds per day previously discharged. A detailed review of operating, maintenance and other procedures is now in progress, and, hopefully will make possible a further reduction.

Phenols and other coke plant wastes, such as naphthalene, are the subject of other investigations. Although Inland operates two phenol and three naphthalene recovery systems, it is recognized that some of these reputed odor and taste producing materials escape. In this connection, we have under way an experimental program to determine whether the residual phenol in dephenolized waste can be further reduced by biochemical treatment. Suggestions and help in this project have been received from the Indiana Stream Pollution Control Board.

The report cites values of oil discharge which figure out to a concentration of 6.2 parts per million. Further reduction poses an extremely difficult engineering problem when these discharges are mixed with a half billion gallons of water. We know of no way to eliminate oil completely, but as a step to use one of the water treatment means available to us, plans are currently in progress to more than double the size of an existing oil separation lagoon.

May I point out here that it is common practice for regulatory agencies to approve discharges carrying oil in much higher concentrations than the 6.2 ppm which formed the basis for the PHS report.

Inland also received attention in the report for discharging waste pickle liquor. The Indiana Stream

Pollution Control Board has been asked for approval for deep well disposal into the Mount Simon formation at a depth of over 4,000 feet. It is only recently that any practical method has been developed and to date, we know of only one successful installation. As a possible alternative, we are studying a plan for substituting the use of hydrochloric acid for sulfuric, with inclusion of a complete recovery system. Extensive studies providing a basis for initiating such a program have already been carried out.

Blast furnace flue dust has been cited as another pollutant causing difficulty. All Inland blast furnaces are served by thickeners and filters. Routine sampling and analysis indicates consistent recoveries of 97% to 99%. This high efficiency results from installation of low volume, high energy, scrubbers which were installed recently to reduce the flow to the thickeners, and thus increase the recovery of flue dust.

A listing of water treatment facilities at the Indiana Harbor Works follows:

Existing Facilities

13 scale pits at:

19" Mill and #1 Billet Mill
100" Plate Mill
24" Bar Mill
#1 Blooming Mill

Spike Shop
76" Mill
44" Mill
#2 Blooming Mill
#3 Blooming Mill
#4 Slabber
10" Mill
14" Mill
28" and 32" Mills

2 Ammonia recovery stills

2 Settling pits - ammonia still waste liquor

2 Phenol recovery plants

3 Naphthalene recovery units

4 Settling basins - quench water

2 Thickeners - 140' diameter each

1 Thickener - double tray, 80' diameter

5 Sludge Filters

2 Sanitary Sewage Treatment Plants

2 Waste Lagoons

2 Oil Recovery Plants

1 Flotator - Clarifier and Oil Recirculating System

5 Roll Collant Tanks and Separators, and I think Perry Miller had 2 settling basins in his report that I forgot when I wrote this.

New Facilities Under Construction

Expansion of #2 Sewage Plant

#3 Sewage Plant

Scale Pits and Oil Separator - #2-A Bloomer and Billet Mill

No. 4 B. O. F. - Isolated Recirculation System - No Discharge

Complete waste water treatment plant - 80" Mill

The No. 4 B. O. F. (Basic Oxygen Furnace Steelmaking plant) scheduled for completion this year is designed for an isolated water recirculation system. All waste water will be treated, settled and reused, with no discharge.

The waste water handling and treatment plant at the 80" Hot Strip Mill is worthy also of more detailed discussion, since this installation is an outstanding example of modern industry's effort to maintain water quality. It is the result of the combined efforts of our own Engineering Department, outside engineering consultants, and the Indiana State Board of Health. It combines three multi-cell scale pits equipped for continuous solids removal, oil separators, and four 115-foot diameter clarifiers. There is also a control building with laboratory space, provision for adding coagulent chemicals and other auxiliary equipment. Under construction for the past two years, this waste water treamtment plant is now nearing completion at a total cost of more than 9-1/2 million dollars.

Cost of waste water treatment facilities at the Harbor Works, built and under construction, is about

26 million dollars. This does not include many of the early installations, where it has been impossible to identify separately costs for pollution control.

CORRECTIVE ACTION

We would now comment briefly on the corrective action recommended in the PHS report. I will direct my remarks to the first two recommendations, which affect Inland directly.

RECOMMENDATION NO. 1:

"Industrial plants in both Indiana and Illinois take immediate steps to improve practices for exclusion or treatment of wastes, especially the following constitutents:

> Oil and tarry substances;
>
> Phenolic compounds or other persistent organic chemicals that contribute to taste and odor problems;
>
> Ammonia and other nitrogenous material;
>
> Phosphorus;
>
> Suspended matter; and
>
> Highly acidic or alkaline materials."

Inland is in agreement with the objectives of this recommendation. This requires, of course, that we continue our efforts. Our program, which involves expanded laboratory facilities, an enlarged technical force an in-plant housekeeping and reporting system, as well as our new and improved treatment facilities, is such a continuing effort. We believe the Indiana Stream Pollution Control Board can attest to our increased activity in this area.

RECOMMENDATION NUMBER 2:

"Major industrial plants institute permanent programs of sampling their effluents to provide more complete information about waste outputs. Location and frequency of sample collection should be sufficient to yield statistically reliable values of waste output and its variations. Analysis should include the following: pH, oil, tarry residues, phenolics, ammonia, organic nitrogen, total nitrogen, cyanide, toxic metals, phosphorus, suspended solids and biochemical oxygen demand. Waste water flows should be measured, and results should be reported in terms of both concentrations and tonnage rates. Monthly reports of results, which, by the way, the Blue Book didn't do, should be submitted to the appropriate State water pollution control agencies, where they will be available in open files. Unusual increase in waste output and accidental spills should be reported immediately to the State agency."

We agree that some routine surveillance is desirable but firmly believe that frequency and type of analysis required on individual outfalls must be limited to the significant pollutants in each case. We would object strenuously to a requirement for expensive and time-consuming sampling and analysis unless the results are necessary and pertinent to the problem. Incidentally, all approvals received for waste treatment facilities from the Indiana Stream Pollution Control Board are contingent upon establishment of a technical control and reporting program.

We do object to the open file provision because we believe the files should be open only to those with a legitimate interest. We also feel that administration of the open file provision should be left to the state agency involved.

I would like to make one personal recommendation which is prompted by my experience as one of the original members of the Technical Committee to the Great Lakes-Illinois River Basins Project. I have been impressed by the technical competence of those who have been involved in the direction of this project. I have subscribed to their logical approach to a difficult problem.

The GLIRB staff, in the course of many meetings with the Technical Committee, has stressed the need for developing cause and effect relationships, the necessity for determining the water uses to be served and the requirements for serving those uses.

The Technical Committee formed several work groups, composed of specialists from municipal water departments, representatives of the States of Michigan, Wisconsin, Indiana and Illinois, and from a number of industries bordering Lake Michigan.

These work groups, in cooperation with the GLIRB staff, are even now formulating guides for water quality in Lake Michigan. It is my understanding that the final report on the Lake Michigan portion of the GLIRB project may be a year away. Guides and goals now being developed would be of great value to this conference, particularly in reference to the question of definition of pollution. The solution to problems discussed in this conference must in the final analysis be based on scientific fact and engineering knowledge. A major contribution to this background of fact and knowledge will be the final report covering the Lake Michigan portion of the GLIRB Project.

The work of the GLIRB staff is not completed, nor is the work of the Technical Committee. Because these two important groups have not yet finished their studies, it raises some concern that the importance of the sound and painstaking effort put forth in the GLIRB Project may be overlooked. I recommend that the conferees give careful consideration to this work which is now in progress, and to incorporation of the results in the conclusions of this conference.

On the basis of long personal experience and knowledge of water use in this area, I do not and cannot believe that the quality of Lake Michigan water has deteriorated to a stage of crisis. In some respects, at least, it is better now than it was some years ago because of the installation of new facilities with modern water treatment devices, the renovation of old facilities, and the improvement in industrial waste and sewage treatment practice.

INLAND POLICY ON WATER QUALITY

Any criticism expressed or implied in this presentation has been offered in the interest of developing a reasoned and sound approach to the solution of a mutual problem. Inland Steel derives as much benefit from maintenance of water quality as any who have, or who will appear at this Conference; more in fact than most, because of our many uses of water.

Inland's policy, in respect to maintenance of water quality, is based on the same principles which underlie its policy in other areas. Inland management recognizes its responsibility to its employees, to the immediate community surrounding its plants and to the public generally.

We are committed to the installation of adequate control equipment for each new or modernized productive facility we build, and to continue maintenance and operation of such control equipment.

This policy results in constantly improved water quality. In this present period of tremendous technological change in the steel industry, this improvement is more rapid than heretofore.

To insure that each control installation is truly adequate, we maintain wide industry contacts, employ outside consultants, support activity in many professional and scientific organizations, and are in frequent touch with State and Federal agencies.

Inland stands ready to cooperate in the future, as in the past, in the orderly development of control programs.

Thank you.

CHAIRMAN STEIN: Thank you, Mr. Harbaugh. I would like to take this opportunity to commend Inland. This is a company that has an old plant and while the conferees may not agree with all the plans stated by Mr. Harbaugh, I think the philosophy expressed -- fair exchange of information and the working out of the problem with State, Local and Federal authorities -- has, in the past, proved successful and I am sure will prove successful again.

I am sure any industry that has done that will continue to do it. I would also like to point out, at least for your industry, this seems to be the first statement at this conference where anyone in industry recognizes that the Federal law exists.

Thank you.

Are there any comments or questions from the conferees?

MR. KLASSEN: I didn't have any particular question.

Those of us that know Mr. Harbaugh recognize him as one of the real, technically competent people in his field.

I just wondered if he would -- this is principally for our own use, not necessarily as applies to this conference -- in the flue dust thickeners for the blast furnace system, you consider this any appreciable source of cyanide?

We ran into this in another steel plant in another part of Illinois and frankly, trying to determine whether this is an appreciable source or not, would you want to venture an opinion on this?

MR. HARBAUGH: There are two questions. It is a source of cyanide. I think the amount of cyanide developed in any one furnace depends on a great many things, which, I am hardly competent to go into and can't go into without knowing more about it.

Whether it is an appreciable source depends on the definition of "appreciable".

MR. KLASSEN: Would you say there is any practical means of treating or reducing this if it would be appreciable?

MR. HARBAUGH: Well, I should think so.

There are recirculation systems now and means for recovery -- removing cyanide as it builds up to some predetermined point.

This is one thing that I think now that the question has been raised, we will have to look into a little more thoroughly than we have in the past.

CHAIRMAN STEIN: Are there any other further comments or questions?

Mr. Poston?

MR. POSTON: I would like to comment that I am glad to see that Inland has recognized the figures of the Public Health Service and then moved ahead to make reductions prior to being asked to do this by the Federal Government.

I think this shows that some of the other tools that the Federal Government has for aid in this pollution abatement overall program can be of use. That is, planning for the future and seeing the needs, laying them out ahead of time, and doing this in a cooperative manner with industry, the states and other agencies.

I, too, appreciate Mr. Harbaugh's forthright statement in acknowledging needs, but -- in expressing this desire to cooperate.

MR. KLASSEN: Also, Mr. Poston, I thought you were going to mention it, this open file provision be left to the State agency.

I appreciate this and I would say that it is one -- as one State agency we are willing to accept that responsibility, Mr. Harbaugh, and thanks for suggesting it.

CHAIRMAN STEIN: Are there any further comments?

(No response.)

If not, thank you very much, Mr. Harbaugh, for a very constructive statement.

Mr. Poole.

MR. POOLE: I am going to pass United States Steel once more because we allotted them 45 minutes and I understand they will take most of it.

We offered Union Carbide 20 minutes and this will allow us to finish for lunch about 12:30 if there aren't too many questions.

Union Carbide, I am going to call on -- who is going to present that?

Mr. Leavitt.

MR. LEAVITT: Mr. Chairman and Conferees:

My name is M. C. Leavitt. I am Assistant Plant Manager of the Chemicals Division's plant of Union Carbide Corporation, located in Whiting, Indiana. I am appearing here at the invitation of the Indiana Stream Pollution Control Board. They have designated our plant as a participant in this conference.

Our Whiting plant is one of the Chemicals Division's smaller plants, employing 515 people, about ten percent of whom are college-trained engineers. We manufacture chemicals and plastics. For raw material, we use liquified petroleum gases, known to the trade as LPG; and by the application of heat, and the removal of hydrogen, we convert these gases to a more reactive form, known as olefins. In turn, we react these olefins with air and/or water, and with each other, to form such compounds as isopropanol, acetone, ethylene glycol, and the plastic polyethylene. The consuming public is probably familiar with isopropanol as rubbing alcohol; acetone as nail polish remover; and ethylene glycol as antifreeze for the automobile. Polyethylene appears in many forms, but is commonly seen as protective sheeting, squeeze bottles, and as flexible pipe for underground water systems. I will have more to say about polyethylene later in this statement.

We have read the "Report on Pollution of the Waters of the Grand Calumet River, Little Calumet River, Lake Michigan, Wolf Lake, and their tributaries -- Illinois - Indiana," issued by the United States Department of Health, Education, and Welfare, dated February 1965, and to which I will refer to as the HEW report.

Our plant receives water from the City of Whiting for drinking and sanitary purposes, and this water is returned to the City's sanitary treatment facilities. We have not put sanitary sewage to the lake since 1947.

Lake water is pumped to our plant by four 10,000 gallon per minute pumps which limits our maximum input to 58 million gallons per day. The 43 MGD figure given in the HEW report represents our average usage.

Lake water is used for feed to our steam boilers, to condense the vapors from our still columns, to cool the product from our still kettles, as a reserve for the fighting of fires, and similar industrial uses.

Our operation requires the use of inorganic compounds such as lime and soda ash for water treating, sulfuric acid as a catalyst, and sodium hydroxide for neutralization of the acid. We must remove the hardness from the water before it is fed to the boilers, and these solids are returned to the lake from whence they came. As far as the acids and bases are concerned, all of our water is returned to the lake within a few tenths of the original pH value.

Our products are expensive. They sell for fifty cents to a dollar a gallon in tank car quantities and it is an economic necessity that we hold losses to a minimum.

Despite this, we do lose some product due to equipment leakage, distillation procedures, washing of equipment, operating upsets, and similar occurrences. These losses, being organic in nature,consume oxygen and are responsible for the BOD analysis of our outfall. As I mentioned before, we do not discharge sanitary sewage to the lake.

The HEW report refers to our plant in the Industrial Wastes section on page 21. We are in general agreement that the figures shown here are representative of our outfall. On this same page, the statement is made: "Recently large amounts of pellets of material similar to polyethylene have been found washed ashore on the beaches in Chicago. It is believed that Union Carbide is a possible source of this material." Insofar as we know, we are the only producer of polyethylene in the area, but we supply only one-third of that used in pellet form by processors in this immediate vicinity. Some of these pellets probably originated in our plant and, if so, they represent an economic loss to us. They are extremely inert, have no odor or taste, and do not contribute to BOD. These pellets, while harmless, do detract from the esthetic value of a beach. Our polyethylene plant started operation in 1959, and we have continuously made improvements as we gained experience. One addition was the installation of screens to prevent polyethylene pellets from entering the sewer.

We are currently spending an additional $61,000 to improve this screen system and insure its reliability.

In the operation of a chemical plant, it is sometimes difficult to differentiate between money spent for improving product recovery and that spent to minimize pollution. Since our plant started operation in 1935, we estimate that we have spent almost a million dollars solely in pollution control. Some of the items provided by this expenditure are equipment and piping to remove sanitary wastes from our sewer and transfer this sewage to the treatment facilities of the City of Whiting; the installation of a closed system for that part of our process in which cooling water comes into direct contact with hot gases; a cooling tower, retention basin, screens to remove polyethylene pellets from waste water, sampling devices, outside laboratory analyses, and so forth.

Work on the elimination of products entering the sewer continues to have a high priority at our plant. In addition to refinements in the polyethylene process, we are installing drain lines to collect oil leakage from compressors, relocating storage tanks to collect waste materials, which will be used as fuel for our boilers, and reviewing our distillation procedures to minimize losses and upsets. One engineer is spending full time on these projects and we have emphasized to all of our operating personnel that control of pollution is as important as the manufacture of products.

At our plant, primary emphasis will continue to be given to elimination of pollutants. We are aware of the problem, and it has been brought even more forcefully to our attention by the recent Jones Committee Hearing in Chicago, the GLIRB Survey, and this HEW conference. As brought out in the HEW report, a knowledge of all contaminants present in the outfall is essential to the understanding of the problem. We are using an independent laboratory for these determinations, and equipment is being installed in our own laboratory so that we can make a more comprehensive water analysis. We will continue to keep the Indiana Stream Pollution Control Board informed as to our actions, and furnish them all the information necessary for their studies.

To summarize, we have already spent almost a million dollars toward the elimination and control of pollution. This is a continuing effort on our part and we have many projects being implemented or in planning for the further reduction of chemicals discharged to Lake Michigan. These projects include refinement of existing pollution control facilities, collection of wastes for disposal by burning, treatment of certain wastes from equipment washing and maintenance, and improvement of operating procedures and techniques. Sampling and analysis of our effluent will yield statistically reliable values of our waste and its variation. We will continue to cooperate fully with the Indiana Stream Pollution Control Board and make available to them any information they desire. Finally, we wish to commend the authors of the HEW report for their excellent presentation of the problem.

Thank you for your attention.

CHAIRMAN STEIN: Thank you, Mr. Leavitt, for an excellent presentation.

Are there any comments or questions?

MR. KLASSEN: Mr. Chairman, I certainly don't want to get into the position of defending pellets, but, I do think that they have served a very useful purpose.

To me, they are in the same category as detergents. They call public attention like no other gimmick that the sanitary engineers could have developed to bring about the awareness of the people.

We have seen here in this audience -- people can't understand BOD or PE, but when they see detergents, they are suddently conscious that somebody used this water before they did, and I think this serves a very useful educational purpose because we are going to have to become accustomed in this country to use water that somebody else has used before, because we can't all continue to live up-stream.

So, while I am glad that you, of course, are going to remove the pellets, I think in this respect they have done a job which I say is parallel with our fine press coverage, making the public aware there was something in their water.

MR. POSTON: I think what Mr. Klassen is saying, the Board of Directors will be on the lookout to find the source of a little extra dividend for the shareholders.

I would like to comment on the effect that I think you brought out a very important point when you emphasized to all of your operating personnel that control of pollution is as important a manufacturer of the product. I think many of our cases that have been brought to the public's attention occurred because of a spill because of some employees' failure to recognize a hazard and have either dumped or carried out some operation where a spill has occurred, and as an example, recently with an aluminum tank which was to carry alkaline solution and they put in an aluminum tank. It wasn't very long before the whole contents of this aluminum tank, alkaline material, had gone on the ground because aluminum will not hold strong alkali solutions.

Many examples that we here have and see where there's been pollution because of poor housekeeping, just nobody being concerned about what is happening to some of the waste products.

MR. KLASSEN: I had one more question that I had here that I neglected to ask Mr. Leavitt.

I say this with a background of considerable experience that we have had with the Petro Chemical Company in Illinois--National Petro Chemical Company and their waste problem involving a question of toxicity of their waste products either individually or in combination that might be discharged. So far as I know, that Company was the first and the only industry to employ, and they did this--this was done at the Ketterling Laboratory, University of Cincinnati--to conduct toxicity studies, including even small areas on their waste because this was an important question.

Has your company done any of this or have you any assurance that the materials or combination of materials that you are discharging are not toxic?

MR. LEAVITT: In all due respect to National Petro Chemicals, Mr. Klassen, who are one of our valued competitors, I think you will find in the record that Union Carbide had done this work much before them. This was done at the Mellon Institute and we have been in the chemical business since 1925.

We are the first, really, in the synthetic business and we have complete records on all of this which was obtained at the Mellon Laboratory in Pittsburgh.

MR. KLASSEN: Thank you. I wish I would have talked to you years ago.

MR. CHESROW: You added that you are the only producer of polyethylene in the area. Well, I want to point out, the pellets that have been found on the Chicago beaches portray the flow of current to our area.

Now, this is a good example of pollutants coming to the Chicago beaches from the Indiana area.

CHAIRMAN STEIN: Mr. Leavitt, you want to comment?

MR. LEAVITT: I have no comments on the lake currents, sir.

CHAIRMAN STEIN: Are there any further comments or questions?

(No response.)

If not, thank you very much, Mr. Leavitt.

MR. LEAVITT: Mr. Le Bosquet gave you gentlemen a sample of plastics. Here is how the pellets leave us.

MR. CHESROW: They are uncomfortable underfoot.

CHAIRMAN STEIN: They look cleaner from the plant than when they are found on the beach.

MR. LEAVITT: You may be interested, I have used this as mulch in my garden and my wife objects to it. She continually refers to it as tapioca in the ground. They are still the same color as when they were put in three or four years ago.

I don't know what that has picked up (indicating).

That is the way they look when they make them.

CHAIRMAN STEIN: Maybe Colonel Chesrow wants to indicate this, or Mr. Klassen, what is in the water. If they pick it up in the water like this -- off the record.

(Discussion off the record.)

MR. LEAVITT: They happen to be a little expensive if you don't happen to be an employee of Union Carbide.

(Laughter.)

MR. POSTON: Do these come in various colors?

MR. LEAVITT: Normally, a processing plant makes them this way and the color is added. I mean, a manufacturing plant produces them this way, although we are now making some black pellets.

MR. POSTON: The reason I asked that, I understood the pellets found over on the Michigan beaches were colored, some of them were red.

MR. LEAVITT: We do not make any colors other than this in black, and very little black in proportion to this type.

CHAIRMAN STEIN: Just a few black in these that they found on the beach (indicating).

MR. POOLE: Maybe they didn't come from Union Carbide.

CHAIRMAN STEIN: Are there any further questions or comments?

(No response.)

Thank you very much, sir.

Mr. Poole, do you have an announcement to make?

MR. POOLE: We have as a must remaining for this afternoon, the United States Steel Corporation, American Oil, American Maize Products, the City of Hammond and Lever Brothers.

I can assure you those five are going to give us a full afternoon.

I hope all the rest of you who are on the Indiana list, and I am sure you have seen the program or the agenda, will cooperate with the head table, and some time during the noon intermission will turn in to Mr. Miller or me your statement which I can pass on to the other conferees and particularly important, one for the record.

If anybody feels, other than those that I have mentioned, that he or she is absolutely compelled to talk, we will work you in after the five important ones, and it may be pretty late in the afternoon.

CHAIRMAN STEIN: That is right. Mr. Poole has indicated what his preference is on the time and Mr. Poole is in full charge of Indiana time.

What we intend to do this afternoon is go to approximately 4:30, have a short recess and if anyone wants to do this, we will be available.

Now, anyone who puts his statement in the record is assured he will have it appear in the record as if read. This will be given, I can assure you, full consideration by the conferees. Because when the conferees discuss this, the statements will be as fully considered as if they were read.

With that, we will recess for lunch and reconvene at 2:00. Thank you.

(Whereupon, the proceedings in the above-entitled matter were continued to 2:00 P.M., the same date.)

AFTERNOON SESSION

CHAIRMAN STEIN: May we reconvene.

Mr. Poole.

MR. POOLE: Next on my list is the United States Steel Corporation which is represented here by Granville A. Howell, Assistant to Administrative Vice President of United States Steel Corporation.

Mr. Howell.

MR. HOWELL: Mr. Chairman, Conferees, ladies and gentlemen:

I am Granville A. Howell, Assistant to the Administrative Vice President, United States Steel Corporation. I have been delegated to report to this Conference the water conservation progress of U. S. Steel's Northern Indiana facilities.

If you will permit a personal word, this occasion marks the beginning of my 47th year of water conservation stewardship for the U. S. Steel's Gary facilities.

U. S. Steel has a direct and vital interest in water conservation. Water is vital to our processes. Our thousands of employees in the Chicago area drink Lake Michigan water. They and their families use the lake for recreational purposes. As a Corporation, we have been committed for years to research and installation of facilities to control industrial waste. We want to be a good neighbor to the communities in which our employees live. Our plans for the future include the installation of the most modern control equipment on all our new facilities, improvement of control equipment on older facilities and continuing research in all phases of the problem. We have cooperated through the years with local control authorites in Indiana and Illinois, and we feel that progress is being made.

Every time the subject of water temperature comes up--and it does rather frequently these days--I recall my baptism by immersion in the Grand Calumet.

Checking level and flow one icy February morning, I fell in up to my neck. My fellow workers pulled me out, a solid cake of ice, and I resolved that day never again to swim in the Grand Cal.

I started at Gary in 1917 and one of my first assignments was laying out the sedimentation basins you will see in this presentation. The Grand Calumet flowed by No. 4 Blast Furnace, and we were forced to move it--the river, I mean--south to its present location, to make room for three new blast furnaces which would help meet the Nation's needs for armor and ammunition in the First World War.

It sounds odd to pick up a river and move it, but then everything about this wandering stream has been unusual.

Prior to the industrial development of Gary the character of the Grand Calumet was such as hardly to merit the use of the name"river" and it was described as more of a bayou than a river. Generally, and especially in the eastern six or seven miles, it was a winding, twisting, tortuous, boggy stream usually no more than one or two feet deep with an occasional pool of from eight to ten feet. From time to time it turned into a marsh or bog with no discernible channel at all. A fair idea of its nature may be obtained by the fact that in this area, a person desiring to travel the stream in a boat would use a punt and a pole, since at places, a rowboat could not pass.

Much of this eastern stretch of the stream was on the large tract of shorelands which were acquired in the early 1900's by U. S. Steel Corporation. After commencing construction of the steel mills on these lands in the area which became the City of Gary, U. S. Steel, at its own expense, straightened the channel of the Grand Calumet for about two miles east of the street which is now Broadway. This work was done for drainage and sanitation purposes and provided the stream in this area with a straight, well-engineered, banked channel.

The Grand Calumet and the Little Calumet Rivers were, until some 170 years ago, parts of the same stream. Its origin was the eastern part of Porter County, Indiana, several miles south of Lake Michigan. It flowed westwardly into Illinois, along the channel now known as the Little Calumet River, turned Northwestwardly until it reached the Blue Island Bluffs and then turned eastward and flowed roughly parallel to and north of its original course, along the channel now known as the Grand Calumet River, entering Lake Michigan in the vicinity of what is now Marquette Park, in Gary.

According to Indiana historical sources, changes occurred 170 years ago which altered the character and flow of the river. These authorities indicate that in the area between Calumet Lake and Wolf Lake, which mainly consisted of swamps and marshy lands, Indians built a canoe portage which diverted Calumet waters north from that point into Lake Michigan. This rendered negligible the eastward flow in what is now called the Grand Calumet. As a result, sometime before 1845 and probably as early as the 1820's the "mouth" of the Grand Calumet at Lake Michigan was closed by winds and shifting sands. The current of the stream, such as there was, shifted thereafter from east to west.

Lake Michigan caused the second flow diversion. When I first met the Grand Calumet, its waters flowed westerly into the Calumet Sag channel at Blue Island and ultimately reached the Mississippi through the Des Plaines and Illinois Rivers. Lower Lake Michigan levels then diverted the Grand Calumet flow into the Lake through the Indiana Harbor Ship Canal.

Since we are now in the low dip of the water cycle, there is every probability that we will encounter another flow reversal in the Ship Canal as Lake Michigan rises.

This river, legend tells us, was named for the reeds growing along its marshy shores which the Indians used as stems in their calumets, or peace pipes.

Evidence shows, however, that the habitants of the Grand Calumet didn't enjoy uninterrupted peace. In excavating for a powerhouse in the old Calumet marsh area during the 20's we unearthed an ancient military musket.

The Grand Calumet, in turn peaceful and embattled, sending its waters first east, then west, then north, finally emerged from a bayou into a river when man saw the industrial possibilities of the Calumet Region.

If ever he shaped a river's destiny, man did the Grand Calumet's, guiding its very course to serve the needs of this mushrooming industrial community in Lake County, Indiana.

And if ever a river merited the term "workhorse of industry" that title has been earned by the

Grand Calumet.

How well, then, have we taken care of this workhorse of a river that serves so many people? This part of my report will cover U. S. Steel's performance in fulfilling that part of the responsibility within its province for safeguarding the interstate waters.

Our report of water pollution control progress at U. S. Steel's Northwestern Indiana facilities will cover, primarily, the three adjacent steelmaking plants: Gary Steel Works, Gary Sheet and Tin and the Gary Tube Works. The Gary Tube Works utilizes Gary Steel Works sewers.

U. S. Steel has two other Gary plants.

The American Bridge Division's Gary Plant has constructed separate sewers which deliver all sanitary wastes to the City of Gary Treatment Plant and stormwater to the Grand Calumet. A well supplies what little process water they need and, all of it is recirculated.

The Universal Atlas Cement Plant at Buffington pumps water from Lake Michigan for cooling, and boiler feed water supply. The cooling water returns to the Lake with its quality unimpaired. Universal's sanitary treatment plant has been officially declared adequate to serve 1,000 persons--more than ample for Universal's Buffington employees. The plant Engineer at Universal Atlas recalls with considerable satisfaction that on his last visit to the plant, Mr. Woodley of the Indiana State Board of Health noticed fish swimming at the point of discharge into Lake Michigan.

United States Steel's Gary facilities have aligned their control efforts with the three objectives of Indiana's Stream Pollution Control Board as set forth on September 6, 1963, by Blucher Poole, the Board's Executive Secretary: Unreasonable pollution be abated as soon as possible; new facilities to provide adequate treatment; existing industrial plants must provide adequate treatment facilities as part of all plant renovation or expansion.

We not only accept them as the embodiment of the law of the land; we embrace them as a sound, realistic approach to our water problems.

On this note, then, may I begin the examination of U. S. Steel's water conservation progress at Gary with our newest facilities.

The new 84-inch mill: Sketched into the left foreground of this (slide 1) aerial photograph of U. S. Steel's Gary, Indiana, facilities, is the new 84-inch hot strip mill as it will appear in 1966. Over four-fifths of a mile long, the new mill will be capable of rolling in a single year "enough steel for a band more than six feet wide that would encircle the earth nearly

15 times." The new mill will double the Corporation's ability in the Chicago industrial area to produce hot steel strip to supply the rising demand for light, flat-rolled steel products.

These engineers (slide 2) at the construction site of the new 84-inch hot strip mill illustrate the approach of United States Steel plants to the new industrial waste control problems that confront them every time they install a new production facility. They are examining the site for the equipment designed to control waste discharges which will accompany the operation of the new 84-inch mill.

Mill scale will be the principal waste control problem in this new installation. Hot steel oxidizes rapidly and the scale formed is removed in the rolling process and carried away in a stream of cooling water to scale pits.

Three scale pits located over the four-fifths of a mile length of this new facility have been designed with the latest technology to prevent virtually all of the mill scale from escaping.

The roughing section primary scale pit will be 58 feet long and 57 feet wide. The secondary pit will be 121 feet long and 18 feet wide. They will settle out scale from the roughing stands, which house the mill's first reducing rolls. It will be divided into compartments for scale removal in successive stages.

The second scale pit, 110 feet long and 18 feet wide, will serve the finishing stands.

The third pit, 87 feet long and 18 feet wide, will remove scale from the run-out table.

The effluent from the finishing stand scale pit will be further treated in deep-bed sand filters.

Tramp lubricating oil will be the other waste problem on the new 84-inch mill. Each of the three scale pits will be equipped with mechanical skimming devices designed for maximum waste oil recovery.

Oxygen steelmaking shop: Now, may I show another aerial photograph (slide 3) to locate the new oxygen steelmaking facilities now under construction at Gary.

This structural steel framework (slide 4) will house the basic Oxygen Steelmaking Shop.

The engineers in the foreground (slide 5) play a vital part in the construction of this new steelmaking facility. Theirs is the responsibility for installation of efficient waste control equipment as an integral component of this ultra-modern steelmaker.

In this process, the vessel is charged with steel scrap, blast furnace hot metal and fluxes. The charge is then refined by blowing oxygen into the metal bath. During the blow, large volumes of hot, dust laden gases are emitted from the mouth of the vessel and are collected in a water-cooled hood and then directed to the gas cleaning facility.

The water to cool the surface of the hood will be circulated between the inner and outer shell and will never come in contact with the dirty gases before discharge to the river.

The gases leaving the vessels (slide 6) will be cooled by water sprays and enter the gas cleaning plant through this main (1) to the gas cleaning facilities. The effluent water will wash along the bottom to the main to the scupper (2) located just ahead of the Venturi scrubber. Water and solids collected in the scupper will be piped to a stationary screen, where particles 1/2-inch and larger will be removed, and finally to a callow cone (3) where additional settling will take place. The solids from the callow cone will be continually drawn off as a flurry to the classifier and thickener (4). The overflow water will be recirculated back to the gas cooling tower and then recycled to the gas cleaning system.

From the scupper the gases will pass through the narrow throat of a Venturi scrubber (5) where intense water sprays will wash out the dust particles.

There will be two such throat sections for each of the two separators shown in the drawing. They will be connected in parallel so that each will process one-half of the gas.

The cleaned gas and dirty water from the Venturi enters the cooling towers (6) at the bottom where the dirty water is collected and drawn off.

The clarifiers, 60 feet in diameter, will collect the solids at the bottom and remove them to a centrifuge for dewatering. The water will be recirculated back to the thickener and the solids removed as filter cake.

Blast furnaces flue dust recover: These (slide 7) are the 12 blast furnaces, which supply iron to the open hearths and will also supply the new OSM shop.

Landmarks on the Lake Michigan skyline, they helped build our country and the product they make reaches through the fabric of our economy into the daily lives of every one of us.

The rails that carry you across the continent, the floor of the Mackinac Bridge that transports you to Michigan's upper peninsula, the automobile that takes you to work, the steel structure of Chicago's newest skyscraper, bear the stamp of these furnaces.

Converting into iron the mountains of ore and limestone you see at the left in this slide produces a lot of flue-dust-laden water, and this part of our presentation describes the network of control devices employed at Gary to keep the elusive iron oxide particles from bothering our down-stream neighbors.

Each (slide 8) Gary Works blast furnace is equipped with a four-stage system for flue dust control, and three of the four stages are shown in this photograph.

Dust generated in the blast furnace passes through the top of the stack to the dry dust catcher where the heavier dust particles are deposited.

The finer particles that escape the dry dust catcher are moved from the gas stream by sprays in the washing unit. In the third treatment stage the fine dust is captured wet in a Venturi scrubber or electrostatic precipitator.

The dust laden liquid (slide 9) from the cleaners flows to four sedimentation basins like this where part of it is intercepted as wet sludge with the effluent water going to the Grand Calumet.

This huge control complex, designed to do the job when installed, has an increasingly difficult time in keeping up with today's much heavier production loads.

As far back as 1923, it was realized that too much flue dust was escaping into the river and dredging of the Grand Calumet commenced.

This dredge (slide 10) operates practically full time pumping flue dust out of the Grand Calumet that escaped our treatment processes. The dust laden liquid is pumped (slide 11) to these settling ponds where it settles out and the effluent water flows to the river.

Thus, dredging and lagooning have served as the final stage, so to speak, in our flue dust treatment.

This blast furnace control system is not reported as a complete and final solution to our flue dust problem, but rather to indicate what we are doing to fulfill our responsibility in this area until our treatment facilities catch up with our production advances.

Now, having described our newest and oldest treatment facilities, let's examine our day-to-day performance at U. S. Steel's Gary facilities in keeping the waterborne wastes generated in steelmaking out of the river.

Mill scale recovery: Mill scale is one of the heavy-weight control problems at Gary. As we have already said, hot steel oxidizes rapidly and the scale formed must be removed before it is rolled. This is done by"scale breaker rolls" and huge pressure sprays with the scale settling pits providing successive sedimentation stages.

Depicted in red (slide 12) is our new 160/210-inch Plate Mill.

The (slide 13) mill scale recovery system installed as an integral function of the new mill is illustrated in this diagram.

A water flume runs the entire length of the Mill's rolling section from the scale breaker, arrow 1, the Mill proper, arrow 2, to the leveler, arrow 3.

This view (slide 14) of the scale pit shows the various stages of scale recovery.

Another function (slide 15) of the scale pits is waste oil removal. Surface skimming keeps waste oil out of the effluent water.

This sampling pump (slide 16) is one of two which automatically deposit a composite sample of the effluent water from this Plate Mill in this five-gallon container every day.

A U. S. Steel chemist (slide 17) is shown here analyzing the effluent samplings for solids, oil value, and pH.

Representatives of the Indiana Water

Pollution Control Board reviewed steps taken in the design and engineering of this mill scale treatment system.

This (slide 18) shows the clamshell bucket and scale it has removed from the 46-inch Slabbing Mill Scale Pit. It was installed when the 46-inch Mill was built in 1958. It is performing adequately under tight operating controls.

All Gary rolling mills, including the rail mill, the 44-inch blooming mills, and the 11 bar mills have scale pits. The older ones are suffering from overloading. Built in accordance with the technology of the time to handle much lighter production loads, they are not containing all of the scale generated in today's rolling operations.

Treatment of spent rolling oils: Our discussion (slide 19), up to this point, has covered waste lubricating oil control as a function of the scale pits. Waste cold rolling lubricants are handled separately. While some of the cold rolling oil readily separates and floats, most of it is emulsified in the water and difficult to remove.

U. S. Steel's recent facilities have made substantial progress in keeping this particular effluent out of the Grand Calumet River.

Have you ever seen a waste water treatment facility which occupies three times as much area as the production unit it serves?

This is the new 5-stand cold reduction mill, which increases U. S. Steel's ability to produce cold rolled sheet by 50 percent in the Chicago area.

These are the complex treatment facilities for waste cold rolling oils at the new 5-stand mill. They remove rolling oil by gravity separation. Oil skimmed from the top of the separation tanks flows to other tanks for further concentration.

The bottom sludge layer is pumped out for further treatment (slide 22).

Gravity oil separators (slide 23) further treat the effluent from the separation tanks, concentration tanks, and the chemical treatment section. The settled solids are scraped off the bottom and floating oil is skimmed from the top.

This (slide 24) is the end product of the treatment facilities for spent cold rolled oils at the new 5-stand cold reduction mill-intercepted before it could reach the river.

Here (slide 25) we can see an area being prepared for the new 6-stand cold reduction mill. Treatment facilities for waste cold rolling oil at the new mill will be similar to those we just saw for the new five-stand mill.

Coke plant wastes: This (slide 26) aerial photo shows the Coke plant.

The Coke Plant which provides coke for the blast furnaces recovers coal chemicals from the coal charged in the coking process. The major waste stream is used for coke quenching.

Beginning in 1948 in cooperation with the Gary Sanitary District and with the permission of the Indiana Stream Pollution Control Board tests were conducted to determine the efficiency of treating the major waste stream in the Gary municipal plant. The tests proved successful as reported in an article, "Treatment of Ammonia Still Waste by Activated Sludge Process," by W. W. Mathew, General Superintendent of Gary Treatment Plant, in the February 1952 Sewage and Industrial Waste. The article is submitted with this paper.

CHAIRMAN STEIN: It will be included in the record.

(Whereupon, the document referred to above was made a part of the record.)

TREATMENT OF AMMONIA STILL WASTES BY THE ACTIVATED SLUDGE PROCESS

By W. W. Mathews

Superintendent, Gary Sanitary District, Gary, Ind.

Presented at 24th Annual Meeting, Federation of Sewage and Industrial Wastes Assns.; St. Paul, Minn.; Oct. 8-11, 1951.

On October 27, 1950, an experiment was started to determine to what extent ammonia wastes could be treated and phenol effectively destroyed by the activated sludge process. Ammonia liquor from the Gary, Ind., coke plant of the U.S. Steel Company was pumped to the main interceptor on this date and continued without interruption until April 30, 1951. The liquor was discharged at a uniform rate throughout 24 hrs. The first loading was approximately 10 percent of the total load expected. From time to time the load was increased as the experiment progressed.

Local Conditions: The Gary treatment plant is connected to about 200 mi. of combined sewers. Some of the heaviest rain storms have occurred in January and

February. Excessive runoff could have interfered materially with this experiment. At no time during the period were there any severe storms. Heavy runoffs occurred on a few days, but these were caused by melting snow. Generally speaking, ideal conditions prevailed for the entire period of the experiment.

Biochemical Oxidation of Phenol: Using a biological process to destroy phenol is not a new development. Numerous references (1) (2) (5) (6) (7) are available on the use of sprinkling filters and activated sludge for this purpose. Some of the references report experimental work, whereas others record plant operation. The Dow Chemical Company, Midland, Mich., operates a plant including sprinkling filters and an activated sludge plant in series, where large quantities of phenol are destroyed each day. As far as the writer has been able to ascertain, this is the largest phenol destruction project in the world (6) (7). The Milwaukee, Wis., activated sludge plant treats phenolic waste with no difficulty. Probably many plants, either of sprinkling filter or activated sludge types, throughout the country treat this waste or gas plant wastes containing phenol; if it is in low concentrations and has caused no trouble, the operator may not be aware of its being present in the raw sewage.

The Problem at Gary: With the reference

given heretofore, the question may arise as to why the experiment at Gary was necessary. The south end of Lake Michigan which serves as a source of water supply for the four Calumet area cities (East Chicago, Gary, Hammond, and Whiting, Ind.) and the South Side filtration plant of Chicago, Ill., is a critical area as regards pollution. It is mandatory for all municipalities and industries in the area, as a result of a suit by the State of Illinois against the four cities, the State of Indiana, and the industries, to abate and keep all pollution out of the lake. This was agreed upon at hearings before a Master in Chancery, appointed by the U. S. Supreme Court. Certain stipulations were set up and agreed to by the industries.

Gary, having a treatment plant in operation at the time, was excused from the suit. East Chicago and Hammond also had plants in operation and were likewise excused. The city of Whiting agreed to take steps to stop its pollution of the lake. Whiting did not have a sewage treatment plant in operation then and has none in operation now. Arrangements were made by Whiting to have its sewage treated in the Hammond plant for the present. Since the suit, several millions of dollars have been expended by industry in constructing new sanitary sewer systems, connecting to municipal sewer systems, and making process changes (10).

The physiography of the Calumet area is such that effluents from all sewage treatment plants and industries which discharge into the Grand Calumet River flow in great part into the south end of Lake Michigan. Since phenol had never been a pollutant as far as Gary was concerned it was necessary to determine how efficiently it could be destroyed if the treatment of ammonia wastes was to be undertaken as an operational routine. The writer was not enthusiastic about starting the project. It was obvious that if appreciable amounts of phenol passed through the treatment plant and finally into Lake Michigan, the city of Gary would be responsible for this pollution. Estimates based on past performance of the Gary plant, insofar as reduction of 5-day B.O.D. was concerned, indicated that 95 percent destruction might be expected. If this estimate proved to be correct, from 75 to 100 lbs of phenol might be discharged into the Grand Calumet River daily. Some of this, in turn, would find its way into the water supplies of the various cities. If the experiment were to be successful from a treatment standpoint, it meant in this area practically 100 percent destruction would be required.

Study of the problem indicated that certain basic data should be collected during the progress of the experiment and, as much as possible, established as positive facts. These were as follows:

1. Whether the ammonia wastes could be treated effectively, and the efficiency with which phenol could be destroyed;

2. The effect on the treatment process of the variable factors in the ammonia wastes;

3. The effect of the wastes on gas production;

4. Data which would serve as a base in computing fair costs of treating the wastes.

The list, of course, does not purport to cover all the research work possible on this problem. If obtained, however, the data would give a starting point for a more detailed examination of the problem.

The project was cleared as an experiment with the State of Illinois through C. W. Klassen, State Sanitary Engineer, by B. A. Poole, Director of Environmental Sanitation, State of Indiana.

Stipulations Controlling the Experiment: Before proceeding with the project certain stipulations were set up by the Gary Sanitary District, as follows:

Ammonia wastes should be discharged at a uniform rate throughout 24 hrs.;

No change in load should be made except as specified by the District;

The waste would be shut off immediately if necessary;

The test continued for several months, including the month of lowest sewage temperature.

The maximum load expected as from 1,500 to 2,000 lbs. of phenol per day in 500,000 gal. of ammonia still liquor. The liquid load was estimated on the basis of 25 gal. of water per ton of coal coked. Phenol content was shown by past analyses as quite low, amounting to less than 0.1 lb. of phenol per ton of coal coked, and this without dephenolizers, as there are none at the Gary plant. E. C. Kennedy, superintendent of the Gary coke plant, stated that the low phenol content results from the coal mix, which contains a higher percentage of low volatile coal than is ordinarily used at most coke plants.

Preliminary Investigations: About four weeks before the experiment started, technicians from Mellon Institute brought in the necessary laboratory apparatus, including a Beckman B. Spectrophotometer. Joseph H. Wells, then Senior Fellow at the Institute, made all arrangements for the laboratory setup. Preliminary determinations were run on river water samples, the raw and clarified sewages, and the final effluent. A few parts per billion were found, but the results were spotty.

Checks were made with the local hospitals and a plastics industry to find if phenol was being used. No phenol was being discharged from any of these sources and the plastics industry had none in stock. It was concluded that these test were not significant.

Treatment results at Dow Chemical Company (6) showed that with lower sewage temperatures in the winter months there was a decrease in the phenol removal, particularly in the sprinkling filter plant. Experimental work (3) (4) has shown that the rate of oxygen utilization by activated sludge and sludge-sewage mixtures decreases with lowering temperatures. With the experiment starting in October, facing decreasing temperatures and increased loadings, it was obvious that the critical point would be reached when the raw sewage was at the lowest annual temperature. From past records this should occur some time in February. On February 11, 12 and 13 raw sewage temperatures of 48°, 47°, and 49° F. were noted. Initially the sewage temperature was 65°F.; at the finish, 60° F. With the completion of this cycle the experiment ceased.

Loads Expected from Waste: Preliminary studies indicated that the increased loading from phenol alone might total about 20 percent of the normal secondary loading. The theoretical oxygen demand of phenol has been shown to be 2.38 lbs. per pound of phenol (1). Laboratory tests showed that with synthetic phenol solution this was 1.9 plus lbs. and that the 5-day B.O.D. is quite close to the ultimate B.O.D. Nothing was known about the 5-day B.O.D. of the ammonia wastes, but later determinations showed this ranged from 1,200 to 1,900 ppm as it left the stills. At no time was it possible to establish a direct relation between the pounds of phenol received on any one day and the 5-day B.O.D. of the ammonia wastes.

Table 1 shows results of analyses of the ammonia wastes. This table is a combination of complete analysis of two samples, plus a few additions on some of the items made during the test. This does not cover the field of ammonia wastes, but rather local conditions. As a result, a wide variation from the values given will be found in numerous articles in technical journals on this waste. (See Page 1213 for Table 1)

It will be noted from Table 1 that this is a complex waste. It may well be designated a "rough" waste to treat. Total solids may show variations from approximately 7,700 to 20,000 ppm with volatile solids ranging from 7 to 46 percent. Suspended solids range from approximately 1,000 to 2,000 ppm.

Description of Experiment: The initial loading was just under 200 lbs. of phenol per day in 43,000 gals. of ammonia waste (Table II) This was held constant

(See Page 1214 for Table II)

TABLE I -- Analysis of Ammonia Still Wastes[1]

Constituent	P.P.M.
Free lime, CaO	0 to 6,940
Calcium, Ca	1,900 to 3,00
Magnesium, Mg	50 to 750
Sodium, Na	50 to 60
Free ammonia, NH_3	60 to 1,820
Carbonates, CO_3	1,700 to 3,600
Carbon dioxide, CO_2	90 to 595
Sulfate, SO_4	110 to 375
Chloride, Cl	2,300 to 2,800
Thiosulfate, S_2O_3	160 to 245
Thiocyanate, CNS	115 to 325
Cyanide, CN	52
Iron oxide and alumina, R_2O_3	40 to 660
Silica, SiO_2	100 to 170
Phenol	400 to 550
Total Solids	7,700 to 20,000
Volatile	7 to 462
Suspended solids	1,000 to 2,000

[1] A combination of two complete analyses plus data noted during experiment. Dilution factor of sewage to ammonia wastes varied from 40:1 to 50:1.

2 percent.

TABLE II.—Monthly Average Phenol Loadings and Miscellaneous Data; October, 1950, through April, 1951

Month (1950-51)	Flow (m.g.d.)	Phenol				pH				Alkalinity (p.p.m.)			Temp. Raw Sew. (° F.)	Ammonia Still Liquor			Total Phenol (lb.)	
		(p.p.b.)		(lb.)														
		Raw Sew.	Final Eff.	Raw Sew	Final Eff.	Amm. Still Liq.	Raw Sew.	Mix. Liq.	Final Eff.	Amm. Still Liq.	Raw Sew.	Final Eff.		(g.p.d.)	Total NH_3 (p.p.m.)	CaO (p.p.m.)	Raw Sew.	Final Eff.
Oct.[1]																	918[3]	1[3]
Av.	21.30	—	—	—	—	—	7.0	7.3	7.3	—	246[2]	238[2]	66	43,000[3]	308[3]	504[3]		
Max.	23.73	—	—	—	—	—	7.3	7.5	7.4	—	272[2]	260[2]	68	43,000[3]	770[3]	700[3]		
Min.	16.51	—	—	—	—	—	6.1	6.8	6.8	—	208[2]	220[2]	64	43,000[3]	130[3]	380[3]		
Nov.																	10,127	9
Av.	21.81	1,881	2	341	0.31	11.6	7.2	7.3	7.5	1,887	221	213	60	81,307	266	429		
Max.	26.54	3,435	5	657	0.80	12.7	7.7	7.5	7.7	3,250	268	252	66	90,000	500	790		
Min.	19.99	818	0	136	0	9.9	6.5	7.0	7.3	1,150	152	168	56	36,700	130	80		
Dec.																	13,401	18
Av.	20.63	2,535	4	432	0.59	11.5	7.3	7.3	7.4	2,306	228	222	55	151,770	400	568		
Max.	28.12	4,194	11	725	1.76	12.5	7.7	7.6	7.7	5,300	300	256	57	194,400	670	1,800		
Min.	17.37	1,213	0	210	0	9.5	6.5	6.9	7.1	1,200	108	148	53	86,000	210	0		
Jan.																	21,514	23
Av.	23.05	3,617	4	694	0.75	10.9	7.7	7.3	7.5	3,785	224	232	53	225,948	775	530		
Max.	27.00	7,270	20	1,530	3.77	12.7	8.3	7.5	8.3	6,100	336	272	56	280,800	1,820[4]	1,290		
Min.	18.21	97	0	20	0	9.7	6.6	7.0	6.9	2,200	108	144	51	47,700	350	0		
Feb.																	23,462	15
Av.	20.70	4,870	3	836	0.52	11.4	7.8	7.3	7.3	4,322	233	234	52	281,680	884	770		
Max.	26.10	10,046	6	2,090	1.17	12.2	8.7	7.7	7.5	6,950	320	284	54	331,000	1,250	3,230		
Min.	15.79	3,370	0	334	0	10.3	7.0	6.9	7.0	2,500	164	180	47	197,000	420	0		
Mar.																	28,333	8
Av.	21.76	4,931	2	914	0.28	12.2	7.3	7.2	7.3	8,328	211	214	52	257,900	277	1,125		
Max.	26.15	8,547	5	1,821	0.92	12.5	8.6	7.6	7.6	6,750	292	256	55	436,000	1,080	6,940		
Min.	16.67	2,605	0	329	0	9.6	6.5	7.0	7.0	1,500	172	188	50	174,000	70	0		
Apr.																	47,339	9
Av.	22.89	8,242	2	1,578	0.31	11.9	7.3	7.2	7.3	2,905	216	224	55	429,667	159	1,084		
Max.	27.80	12,390	7	2,280	1.40	12.6	7.7	7.5	7.6	7,500	272	252	62	518,000	410	3,060		
Min.	19.44	2,650	0	474	0	9.6	6.6	7.0	7.0	1,350	120	168	52	320,000	70	400		

[1] Experiment started in October. [2] For 8 days preceding experiment. [3] Five days only (27th to 31st). [4] Lime slaker out of service.

TABLE III.--Monthly Average and Maximum Phenol Content of Ammonia Still Wastes, November, 1950, through April, 1951.

Month (1950-51)	Phenol Load[1] (lbs./day)	Ammonia Still Liquor[1] (g.p.d.)	Phenol in Still Liquor (lbs./1,000 gals.)	Max. Phenol in Still (lbs./1,000 gals.)
November	341	81,307	4,2	7.6
December	432	151,770	2.9	3.8
January	694	225,948	3.1	5.9
February	836	281,630	2.7	7.0
March	914	275,900	3.3	4.5
April	1,578	429,667	3.7	5.4

[1] Average values.

(See Page 1215 for Table III)

until November 3, when the phenolic load was increased, presumably, to 400 lbs. per day with a flow of 86,400 gal. of waste. It was found that although it was a simple matter to control the rate of flow, phenol load varied considerably with uniform flow. Loading in the secondary bracket--that is, during November-- averaged only 341 lbs. per day (Table III). Daily loading of phenol in this second bracket ranged from a low of 136 lbs. to a maximum of 657 lbs. Mixed liquor solids had been increased from 1,100 to 1,354 ppm. (Table IV). On November 2, and each day following when backpressure on the blower system permitted, a second blower was operated, usually from 4 to 8 hours per day and sometimes longer.

(See Page 1217 for Table IV)

The phenolic load was increased by increments up to March 21, 1951, when the total waste was discharged to the interceptor. This continued until the experiment was terminated. A railroad strike during the winter interfered with coal mixes at the coke plant and necessitated changes in coking time from 17 to 24 hrs., along with temperature changes. In one month this caused the load to vary daily from a low of 20 lbs. to a high of 1,530 lbs. (Table II). These fluctuations did not affect the efficiency of the treatment process or the efficiency of the oxidation of phenol.

The highest concentration of phenol in

TABLE IV.—Activated Sludge Plant Data,[1] October, 1950, through April, 1951

Month (1950–51)	Flow (m.g.d.)	Susp. Solids (p.p.m.)			5-Day B.O.D. (p.p.m.)			Susp. Sol. (p.p.m.)		Sludge Return (%)	Air (cu. ft./gal.)	Total Air (1,000 cu. ft./day)	D.O. (p.p.m.)		Aeration Period (hr.)
		Raw Sew.	Clar. Sew.	Final Eff.	Raw Sew.	Clar. Sew.	Final Eff.	Mix. Liq.	Return Sludge				Mixed Liq.	Final Eff.	
Oct.															
Av.	21.30	264	101	5	140	77	4	1,354	4,333	40	0.47	9,723	1.8	8	5.09
Max.	23.73	522	135	11	212	115	10	1,772	7,060	53	0.64	9,984	5	9	
Min.	16.51	104	68	2	62	28	1	972	2,500	34	0.38	9,065	1	6	
Nov.															
Av.	21.81	319	114	7	154	87	6	1,581	6,218	36	0.53	11,277	2.7	8	5.03
Max.	26.54	466	188	20	240	134	11	2,288	8,866	52	0.76	13,581	6	9	
Min.	19.99	157	65	2	97	46	4	1,044	3,684	29	0.41	9,174	1	7	
Dec.															
Av.	20.63	414	114	11	182	100	7	2,530	8,181	46	0.56	11,062	3.3	9	5.04
Max.	28.12	812	203	23	266	164	10	3,592	9,273	51	0.72	12,704	8	9	
Min.	17.37	190	49	3	111	66	3	461	7,823	32	0.33	9,308	1	7	
Jan.															
Av.	23.05	323	126	12	159	109	8	3,035	11,333	39	0.54	11,719	3.9	8	4.76
Max.	27.00	699	274	28	282	212	16	4,150	20,416	48	0.67	13,452	8	10	
Min.	18.21	133	80	4	104	67	4	1,886	7,508	30	0.41	9,829	0.6	5	
Feb.															
Av.	20.70	404	305	12	183	162	6	3,547	13,426	48	0.55	10,913	4.4	8	5.04
Max.	26.10	741	1,296	20	358	539	11	4,286	25,620	68	0.73	12,531	8	10	
Min.	15.79	212	85	7	83	54	3	2,500	8,358	30	0.44	9,555	2	6	
Mar.															
Av.	21.76	491	188	13	197	110	6	3,240	12,543	39	0.49	10,019	3.8	8	4.88
Max.	26.15	1,537	890	25	713	297	12.3	4,114	23,904	54	0.73	12,246	8	10	
Min.	16.67	222	78	6	103	50	3	2,328	7,460	24	0.38	8,121	0.6	5	
Apr.															
Av.	22.89	366	95	8	153	79	5	2,430	9,529	40	0.52	11,431	3.7	8	4.63
Max.	27.80	1,476	170	9	291	115	8	3,122	16,676	51	0.70	12,972	7	9	
Min.	19.44	169	71	7	93	37	2	1,778	7,530	30	0.35	8,842	0.8	7	

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[1] Monthly averages.

the raw sewage was 12.3 ppm. This happened to come on the last day of the run. The final effluent that day showed no phenol. The fact that no phenol registered in the final effluent was not as important as the fact that the results all the way through were consistently low. A phenol content of 5 p.p.b. is equivalent to 1 lb. of phenol in the final effluent, with a flow of 24 million gallons per day. On only 23 days of the experiment was a reading of 5 p.p.b. or more registered.

There were five days in which the final results were out of line with all others. The first was on December 2, 1950, when a heavy thaw and runoff increased the pumpage to 28.12 m.g. This required the operation of a second raw sewage pump for 12 hrs., which reduced the detention period in the aerators to approximately 3.3 hrs. during that time. The final effluent carried a total of 1.8 lbs. of phenol for this date, although loading at this time was only 414 lbs. of phenol in the raw sewage. The short detention period in the aerators was responsible for this result. On December 4, the final effluent showed 1.7 lbs. with a flow of only 19 m.g.d. The mixed liquor solids were out of balance on account of the high rate of pumpage on December 2; the total mixed liquor solids being only 473 p.p.m. explains the amount of phenol getting through the plant.

On January 3, 1951, the final effluent showed 17 p.p.b., with 2.6 lbs. of phenol in the final effluent. The flow was low (19.23 m.g.) and all operating conditions were apparently normal. No reason was apparent for the high phenol result. Thawing on January 10, 1951, again required a second pump in service for 9.5 hrs., with pumpage of 27.00 m.g. The short aeration period for this time again gave a high phenol content of 3.8 lbs. in the final effluent, with a loading of 994 lbs. of phenol. This demonstrated again the importance of an adequate detention period. On January 11, 1951, with less than 1 p.p.m. of D.O. at the end of aeration, the final effluent carried 1.60 lbs. of phenol. Lack of D.O. was apparently all that was out of line on this date and indicated oxygen deficiency. Undertreatment probably gave the result shown

The preceding data appear to be repetitive, but the information is given in detail because of its importance. With a combined sewer system, flows at any treatment plant will have a wide range from low to high, which interferes with the treatment process. This makes it impossible to produce at all times the high quality effluent desirable when treating an industrial waste that should be destroyed practically 100 percent.

The total amount of phenol received at the plant during the period of test was 145,034 lbs. Of this total, 83 lbs. passed through the plant for an average of 0.44 lbs. per day, or approximately 3 p.p.b. The reduction accomplished was 99.94 percent.

Phenol determinations were made using the technique of the 4-aminoantipyrene test as described by Ettinger and Kroner (9).

Nitrogen Determinations: Nitrogen determinations were run on raw and clarified sewages and the final effluent. Analyses were made for organic, ammonia, nitrate, and nitrate nitrogen. Ordinarily these are not run on raw and clarified sewages, except possibly in special cases where research work may be necessary. In order to have a complete picture of the process before and during the test, these were made daily for about two weeks before and until December 14. There was so little difference shown in the results that after this date they were run once a week, moving up one day each week.

At no time has there been overtreatment at Gary. Nitrates in the final effluent have always ranged from about 0.06 to 0.15 p.p.m. With exceptions of a few maximums up to 0.24 and 0.36 and one of 0.60 p.p.m., averages throughout the experiment stayed within previous limits (Table V). Final B. O. D. determinations have never been hampered by high nitrate content.

(See Page 1221 for Table V)

TABLE V.—Nitrogen Determinations[1], October, 1950, through April, 1951

Month (1950-51)	Nitrogen (p.p.m.)											
	Raw Sewage				Clarified Sewage				Final Effluent			
	Org.	NH_3	NO_2	NO_3	Org.	NH_3	NO_2	NO_3	Org.	NH_3	NO_2	NO_3
Oct.												
Av.	15.0	10.9	0.03	0.10	11.2	12.0	0.03	0.11	5.9	12.0	0.16	0.11
Max.	21.3	16.0	0.10	0.60	16.2	16.0	0.10	0.60	9.0	16.0	0.50	0.60
Min.	10.6	4.0	0.01	0.06	8.7	6.0	0.01	0.06	4.2	4.0	0	0.06
Nov.												
Av.	11.9	12.3	0.07	0.08	9.5	12.8	0.05	0.07	4.5	11.9	0.10	0.07
Max.	18.5	18.0	0.40	0.16	15.7	18.0	0.30	0.16	10.6	18.0	0.40	0.14
Min.	7.0	6.0	0.01	0.06	5.3	6.0	0.01	0.06	2.0	6.0	0.03	0.06
Dec.												
Av.	14.8	16.8	0.18	0.12	8.7	16.1	0.17	0.09	3.2	15.7	0.16	0.08
Max.	20.7	28.0	0.30	0.26	10.6	24.0	0.28	0.16	3.6	22.0	0.40	0.18
Min.	7.0	8.0	0.10	0.08	5.3	10.0	0.01	0.06	2.5	8.0	0.05	0.04
Jan.												
Av.	16.2	17.3	0.23	0.20	11.0	17.3	0.19	0.22	3.8	17.6	0.15	0.14
Max.	22.4	28.0	0.35	0.50	14.3	26.0	0.31	0.40	5.3	28.0	0.35	0.36
Min.	10.9	8.0	0.10	0.12	9.1	8.0	0.07	0.10	2.5	8.0	0.03	0.06
Feb.												
Av.	17.4	19.3	0.56	0.15	26.4	22.0	0.60	0.13	4.1	21.3	0.53	0.09
Max.	19.6	24.0	0.70	0.24	37.2	30.0	0.85	0.20	5.0	30.0	0.75	0.12
Min.	16.0	10.0	0.48	0.10	11.8	12.0	0.40	0.10	3.1	10.1	0.15	0.06
Mar.												
Av.	13.9	14.0	0.29	0.14	10.8	12.0	0.29	0.14	4.6	16.0	0.21	0.15
Max.	17.6	18.0	0.38	0.16	12.0	16.0	0.45	0.16	6.4	18.0	0.25	0.24
Min.	10.4	10.1	0.15	0.12	9.8	10.0	0.13	0.12	3.1	12.0	0.18	0.08
Apr.												
Av.	11.9	10.0	0.06	0.10	8.75	10.0	0.06	0.10	4.12	14.0	0.06	0.09
Max.	14.6	16.0	0.18	0.16	10.6	12.0	0.15	0.12	4.5	16.0	0.13	0.12
Min.	8.7	6.0	0	0.06	7.6	6.0	0	0.06	3.6	12.0	0	0.08

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[1] Monthly averages.

Organic and ammonia nitrogen showed very little variation from past records. Single maximums were somewhat higher, but averages for the entire period showed no marked change from previous data. Averages for organic nitrogen over the entire period were 14, 10 and 4 p.p.m. in the raw, clarified, and final effluent, respectively. Corresponding ammonia nitrogen averages were 14, 13 and 14 p.p.m. The changes were less than had been anticipated.

Functioning of the Activated Sludge Process: During the progress of the experiment certain changes were made in the various parts of the activated sludge process (see Table IV). These included an increase in air blown, higher concentration of solids in the mixed liquor and return sludge, and an increased rate of return. None of these changes were made suddenly except that of return sludge, when, on February 1, 1951, a third pump was placed in operation, which was then operated continuously with the other two pumps until the end of the experiment.

Air Requirements: Air, at the beginning of the test, was being supplied at between 9,000,000 and 10,000,000 cu. ft. per day. This was at an average rate of 0.47 cu. ft. of air per gallon of sewage. (Cubic feet of air per gallon of sewage is not a good unit to use in comparing the performances of activated sludge plants, but it is a handy tool around a single plant.

Cubic feet of air per pound of B.O.D. reduced is the unit ordinarily employed in making comparisons.)

On and after November 2, 1950, a second blower was operated for several hours per day whenever possible, the length of time being governed by the D.O. at the end of aeration. It was not always possible to operate this blower every day because of high backpressure on the blower system. Periods of high relative humidity always cause a rapid rise in pressure when diffuser tubes are partially clogged. With pressure above normal with one blower in operation, it is impossible to place a second blower on the line.

A D.O. of 3 p.p.m. at the end of aeration was desired. Although this was maintained throughout the test, as shown in Table IV, except for October and November, there were short periods when the D.O. was below 2 p.p.m. and one period of below 1 p.p.m. The amount of air supplied, as shown in Table IV, indicates a minimum use. Slightly more air would have been used if atmospheric conditions had permitted. In January, aerators 1 to 4 had clean tubes installed to ensure an adequate air supply until the experiment was completed. Ordinarily tubes are not changed at this time of the year because of the hazardous working conditions from ice forming on the floor of the aerators when drained.

It will be noted that in February, the month of highest B.O.D. in the clarified sewage, the D.O. at the end of aeration was the highest for any month. There was only a slight increase in air over the previous month. The reason for this higher D.O. (also in January) was better distribution of air throughout the length of the four aerators where clean tubes had been installed. Clogging occurs in great part at the head end of the aerators, where return sludge mixes with the clarified sewage and mixed liquor. From one-fourth to one-third the length of the aerators may have a sluggish roll, where tubes are partially clogged, so that the computed aeration detention period does not give a true picture of actual conditions. Only with all tubes clean does the theoretical detention period agree with the actual period.

Solids Concentrations: At the start of the test the mixed liquor solids content was about 1,100 p.p.m. By January, this concentration had been raised so that the average for that month was 3,035 p.p.m. As the ammonia waste load increased (Tables II and III), higher mixed liquor concentration followed (Table IV). Return sludge solids naturally increased with higher mixed liquor concentration. Initially, return sludge averaged about 4,300 p.p.m. and reached a high level in February, with 13,426 p.p.m. when mixed liquor solids was 3,547 p.p.m. Following February, which was the month of highest loading, solids were decreased so that in April they averaged 2,430 and 9,529 p.p.m., respectively. The last five days of April showed ranges in mixed liquor solids of from 1,778 to 2,010 p.p.m., with return sludge solids of 7,520 to 8,812 p.p.m.

It was intended originally to hold solids at 3,000 p.p.m. With the high organic loading in February, and with the higher concentration producing a very satisfactory 5-day B.O.D. in the final effluent, 3,547 p.p.m. was maintained with an average of 6 p.p.m. 5-day B.O.D. in the final effluent, and with a range of 3 to 11 p.p.m. for the month. Working with high concentrations of solids, wasting had to be scheduled carefully to prevent solids building up to excessive levels. It was noticed that at these levels, solids beget solids, and quite rapidly.

Return Sludge Rate Changes: Rate of return sludge has always been maintained at a high level at Gary. When the plant was placed in operation in August 1940, sludge return at 25 percent was tried. In a short time septic conditions developed in the return sludge and the rate was increased. For the first 10 months of 1950, the average rate of return was 35.9 percent. This rate was maintained by operating two out of three return sludge pumps available. These pumps were operated continuously and any changes in the percentage rate were caused by variations in the sewage flow.

To produce a good final effluent with the activated sludge process, aerobic conditions must be maintained throughout the secondary process. This is accomplished by supplying air in such quantities that a satisfactory D.O. is maintained at the end of aeration, plus a rate of return that will permit the return sludge to enter the aerators before septic conditions have had time to develop. The sludge mixture has an extremely high oxygen demand and the supply ceases as soon as the mixed liquor flows over the weirs of the aeration basins. It is obvious that the quicker the sludge can be returned to the aerators, the less chance there is of deterioration due to lack of oxygen. The D.O. of return sludge in overflow manholes at the secondary clarifiers ranges from 1.2 to 3.6 p.p.m. Time of flow from manholes to aerators is from 2 to 2.5 min.

Sludge return uses relatively little power, as it is a low-head pumping operation. The power requirement (minimum for Gary air supply) is one 300-hp. gas engine driving a 7,000-cu. ft. blower; just above minimum requirements may necessitate an additional unit for 2 hrs. per day. Motors for the three return sludge pumps total 60 hp., divided into 15-, 20-, and 25-hp. units. Only two of these are operated under average sewage load conditions. If either additional air or return sludge capacity is needed, it has been found at times that it is more economical to run a 15- or 20-hp. motor for 24 hrs. than to run a second blower unit for 2 hrs. It has been demonstrated that with three return sludge pumps in operation (third unit placed in service), a better final effluent can be produced than by operating a second blower part time.

About February 1, 1951, sludge began to build up on the floor of the secondary clarifiers. (Table IV indicates mixed liquor and return sludge solids at the highest level in February.) Soundings taken three times daily normally show 6 in. of sludge at the center baffles of the 75-ft. square final clarifiers, less than 6 in. at the quarter point, and the same at the outer walls. Soundings are taken by conventional sounding rods with 6-oz. bottles mounted front and back at 6-in. intervals. About this date soundings showed a build-up to 12 in., and in one case to 18 in., at the center. This showed that the rate of return was too low and a third unit was placed in operation on February 1 to bring the sludge blanket down to normal level. All three return sludge pumps were then operated continuously until the end of the experiment, when one unit was shut down. During the summer months (1951) clogged tubes again interfered with aeration and the third pump was again placed in operation. This cleared up a cloudy final effluent. At this time it was impossible to operate a second blower because of high backpressure. When cleaned tubes had been installed in six aerators, the extra unit was again shut down.

Load Changes on Treatment Process During Experiment: Table VI shows the average daily 5-day B.O.D. loading in the clarified sewage. The total for October can be taken as a base, because this checks quite closely with the load for the previous October and succeeding months showed only normal variation.

(See Page 1229 for Table VI)

The heaviest organic loading in the clarified sewage occurred during the month of February. This resulted from a combination of two factors--stoppages in the sludge hoppers and raw sludge suction lines caused a greater depth of raw sludge than usual to be held in storage in the primary clarifiers, plus the increased load of the ammonia wastes. The high level of sludge in the primary clarifiers caused the clarified sewage to carry more suspended solids than usual, almost three times the normal amount. Clearing up stoppages covered the period from February 23 to March 11, after which no difficulty was experienced in pumping raw sludge. It will

TABLE VI.--5-Day B.O.D. in Clarified Sewage, Average Daily Loading, October 1950 through April 1951.

Month (1950-51)	B.O.D. Loading		Air per lb. B.O.D. Removed (cu.ft.)	Aer. Eff., Lb. B.O.D. Dig. per Lb. O_2 Blown (%)
	(lbs./day)	(lbs./day/cu. ft. aer. cap.)		
October	13,676	17.1	655	7.82
November	15,839	19.7	758	7.79
December	17,282	21.5	686	8.61
January	20,944	26.1	601	9.83
February	27,916	34.8	406	14.55
March	19,945	26.0	533	11.08
April	15,125	18.9	801	7.39

be noted (Table IV) that there was a drop in clarified suspended solids and 5-day B.O.D. in March and also in April.

The Gary plant was designed for 170,000 population loading with 10 aerators in service. Assuming a 35 percent reduction of 5-day B.O.D. in the primary clarifiers, this would give approximately 110,000 equivalent population loading for the secondary process. Equivalent population loading from February clarified sewage was 164,000, with only six aerators in service. This gave a loading in terms of pounds of 5-day B.O.D. per 1,000 cu. ft. of aerator capacity much higher than usual, amounting to 34.8 lbs. This previously had reached 22 lbs. only, and the average for the year 1950 was 17.5 lbs. Increased loadings may be obtained through cutting down on aeration capacity by reducing the number of aerators in service. If this is done, however, the aeration period may be decreased to where the quality of the final effluent is degraded and the operator will find that a better effluent can be produced with a lighter loading and lower aeration efficiency.

There is no reason why loads of 35 lbs. or more of 5-day B.O.D. per 1,000 cu. ft. of aeration capacity cannot be used, provided adequate air supply is available and a high rate of sludge return is included in the plant design. It is interesting to note that the "Tentative Standards for Sewage Works," compiled by the Upper Mississippi River Board of Public Health Engineers and the Great Lakes Board of Public Health Engineers (Jan. 1951) specify that "tank volume shall have 30 cu. ft. per lb. of 5-day B.O.D. in the aerator inlet." This is equivalent to 33 lbs. per 1,000 cu. ft. of aerator capacity.

During February, daily loadings in the clarified sewage ranged from a low of 9,000 lbs. to a high of 99,600 lbs. At no time during the experiment were shock loadings experienced with either high alkalinity or acidity. Once the flow of the waste (pH 9.6 to 12.7, with average of 11.5) was started, an alkaline stability was established in the raw and clarified sewages.

The maximum load of 99,600 lbs. occurred on February 3, 1951. This was caused by a heavy carryover of a mixture of primary and secondary solids from the primary clarifiers during a wasting period of 5 hrs. Ordinarily, wasting was for 2 or 3 hrs. with one of the return sludge pumps shut down. This was to decrease the rate of waste sludge into the primary clarifiers and to prevent an excessive carryover. On this date wasting for 5 hrs. was scheduled and the outside operator failed to shut down one of the pumps. This gave a carryover which showed 1,296 p.p.m. in the composite clarified sample, so during the wasting period it must have been much higher. The B.O.D. composite showed 539 p.p.m. Expressed in pounds of 5-day B.O.D. loading this was 99,667 lbs., with an equivalent population load of 585,000. The loading on the aerators was 124 lbs. B.O.D. per 1,000 cu. ft. of aerator capacity and the air per pound of B.O.D. reduced amounted to 124 cu. ft. These two figures happen to be in empirical agreement, which is of no significance.

The total of this load was not known for five days, but on the following day the clarified cone had about 8 in. of solids after settling, whereas ordinarily this is only about 1 in. Wasting was started at once and maintained on a correct routine so that the solids in the aerators were brought down to a normal content. This heavy load was not reflected by a poor final effluent. Suspended solids in the final effluent were 11 p.p.m. on the preceding day, rose to 20 p.p.m. on the day of heavy loading, and on the succeeding day were down to 10 p.p.m. The final effluent 5-day B.O.D. was 7, 6, and 5 p.p.m. for the three days. The sludge index showed the greatest variation, being 119,252, and 121 for the corresponding days.

This loading may be called a false loading, in that it originated in the process itself and is one that would not ordinarily occur. It may also be stated that the carryover was primed or seeded for the biological process, as it carried large quantities of secondary sludge, which had the same pH as the secondary process. Granting all this, the analyses showed that there was a heavy loading of organic material which required treatment. It is further agreed that if the attempt were made to operate on this level for any length of time, with the small amount of air supplied, the previous normal operation of the process would be upset.

The results of this day's operation indicated, however, that in buffering the plant for the loading from the ammonia wastes, the solids concentration in the mixed liquor was higher than required. Also, that there was considerable reserve capacity at 3,500 p.p.m. in the mixed liquor present that day. It was concluded that if at some future time the treatment of ammonia wastes were undertaken as a regular treatment routine, the concentration of solids in the mixed liquor would be built up at a slightly lower rate than was employed in the experiment.

Aeration Efficiencies: Also shown in Table VI is the amount of air supplied per pound of 5-day B.O.D. reduced and the aeration efficiency, which is pounds of 5-day B.O.D. reduced per pound of oxygen blown (not corrected to standard conditions). It will be noted that with the exception of November, heavier aerator loadings required less air per pound of 5-day B.O.D. reduced. Table VI shows that with increased aerator loadings higher aeration efficiency may be obtained.

Since daily organic loadings on the secondary process are beyond the control of the operator, oxygen utilization efficiency is likewise beyond his control. He may have worked out an efficient operating routine as regards concentration of mixed liquor solids, amount of air blown, and rate of sludge return, and produce a highly polished effluent. The efficiency, however, is going to vary from day to day: with an increased load and with the same amount of air, will rise: with a decrease in load, it will decline.

Effect of Wastes on Treatment Process:

No one could predict how the process would react to the treatment of ammonia wastes. Changes were expected and the aerators, final clarifiers, and final effluent were closely watched. Analytical results were checked by visual inspection of the aerators and final clarifiers, and although at times results would indicate a satisfactory effluent, the appearance of the effluent would indicate some changes were needed. Most frequently noticed was a cloudy effluent which tested low in suspended solids. However, this cloudiness usually indicated undertreatment from an air supply viewpoint. A slight amount of air added at various times proved this was what was needed in a majority of cases.

Mixed Liquor and Sludge Index: The mixed liquor gradually lost its brown color as the load increased and assumed a grayish cast. At no time did the mixed liquor have as bright a color, if that word can be used, while treating the ammonia wastes, as when treating a typical domestic sewage. Yet, despite this drab appearance, the B.O.D. in the final effluent was consistently good. Sludge index records indicate that for about two months adjustments were being made in the treatment process to find a good operational routine. Monthly averages of sludge indexes for the 6-month period, November to April, were as follows:

Month	Sludge Index		
	Av.	Max.	Min.
November	224	398	105
December	180	312	87
January	100	282	41
February	83	252	37
March	87	249	65
April	140	369	81

During the first two months the solids concentration was being built up, so that by December 20, 3,000 p.p.m. had been reached. This level was maintained or slightly exceeded until about the middle of April, when the solids were gradually reduced until the waste was shut off. Air supply was from one and two blowers each day when possible. After February 1, when a third return sludge pump was placed in operation the index more or less stabilized, with fewer peaks than in the previous months. From March 1 to 17, inclusive, the sludge index varied only between 64 and 80, with ranges in loading from 9,000 to 48,000 lbs. of 5-day B.O.D. in the clarified sewage and with mixed liquor concentrations of from 2,456 to 4,114 p.p.m. It will be noted that the greatest variable during this period was in the loading, which had a range from low to high of approximately 500 percent.

The treatment process was quite sensitive as regards daily sludge index variations. High loads cannot be determined until five days after they have occurred. Therefore, daily changes in air supply cannot be made to follow changes of load. At times of high loading, with one blower in service, or if a second blower happened to be in operation, the sludge index might vary overnight from around 100 to 300. When this occurred and the index of the previous day was computed, the sludge index could be brought back to normal if extra air could be supplied. High sludge index did not always mean high suspended solids in the final effluent, as shown by the following results at various times:

Sludge Index	Susp. Sol. in Fin. Effl. (p.p.m.)
181	3
199	6
392	7
312	6
382	21
342	20
123	23

Pumpage rate probably had more effect on the suspended solids content of the final effluent than any other factor. One day of high pumpage the sludge index was 41 and the suspended solids concentration in final effluent was 28 p.p.m.

Secondary Clarifiers: Most of the time when treating domestic sewage only, the secondary clarifiers are clear and the raking mechanisms can be seen. About two weeks after the experiment started, a light solids blanket had risen to about 4 in. below the water surface. This left a clear zone over the top of each secondary clarifier and final effluent was skimmed out of this zone over the saw toothed weirs. This blanket held stationary throughout the experiment and never lifted so that a high solids content appeared in the final effluent. Two weeks after the waste was shut off the rakes were again visible. This was on May 13, and they had not been seen since the previous November.

Gas Production: Although treatment of waste did not inhibit the aerobic process, it did cause a drop in gas production. In November, a month of light loading of ammonia wastes, the gas production increased about 20,000 cu. ft. per day over October. This was quite encouraging and it was thought that possibly the alkaline waste would tend to raise gas production. Through December, and up to and including March, each succeeding month showed a decrease. April showed some recovery, but not back to normal. With the waste cut off at the end of April and the contents of the digesters being gradually displaced with raw sludge containing no waste, gas production started to increase. May and June both showed increases and apparently conditions were back to normal in the multi-digestion system. Total gas production for the 6-month period from November to April, over the past seven years, showed the 1950-51 period ranked sixth.

Digestion was irregular with the waste present. There were periods when gas production decreased for a week or two, followed by a recovery period. This was repeated several times from January to April, inclusive, suring the period of heavier loadings of waste. Recirculation and agitation were tried to overcome this handicap, but apparently had no effect. This adds to the cost of treatment. There is the loss of gas, plus the increased amount of gas required to furnish additional air needed for the increase in loading from the waste.

Summary: It has been demonstrated that ammonia wastes containing up to 12.3 p.p.m. phenol, in terms of sewage flow, can be treated successfully by the activated sludge process at Gary, with the waste having a composition as noted in Table I. It has also been demonstrated that the anaerobic process is inhibited by the waste that is pumped to the digesters with the raw sludge, resulting in a decrease in gas production.

Conclusions: Conclusions drawn from the experiments described herein are as follows:

Phenol in the ammonia still waste, in terms of sewage flow, could be treated in concentrations up to 25 p.p.m. and with approximately 100 percent effectiveness, providing there was no excessive build-up in concentration of some other toxic substance that might inhibit the aerobic process;

Solids concentration in the mixed liquor must be increased to take care of the increased load;

Extra air must be supplied because of the additional organic load imposed on the treatment process;

A higher rate of sludge return is required if air requirements are to be kept to a minimum;

Complete destruction of phenol cannot be effected with the aeration period greatly reduced.

Acknowledgments: Other persons working on this project who previously have not been mentioned include San Karan, then Junior Fellow, Mellon Institute, who did most of the laboratory work on phenol determinations; Dean B. Plotts, chemical Engineer, Gary Coke Plant, U. S. Steel Company, who assisted in the laboratory work or substituted for Mr. Karan; and George J. Haddad, Fellow, Mellon Institute.

References

Mohlman, F. W., "The Biochemical Oxidation of Phenolic Wastes." Am. Jour. Pub. Health, 19, 2 (1929).--#1

Kay, A., "Gas Works Effluents and Ammonia." No. 188 Inst. of Gas Eng., London (Nov., 1938).--#2

Sawyer, C. N. and Nichols, M. S., "Effect of Sludge Concentration and Temperature upon Oxygen Utilization." Sewage Works Jour., 11, 1, 51 (Jan., 1939).--#3

Sawyer, C. N., and Rohlich, G. A., "Influence of Temperature upon the Rate of Oxygen Utilization by Activated Sludges." Sewage Works Jour. 11, 6, 946 (Nov., 1939).--#4

Eldridge, E. F., "The Biological Filtration of the Phenolic Wastes from a Gas Plant." Bull.87, Michigan Eng. Exper. Station, East Lansing, Mich. (Nov., 1939).--#5

Powers, T., "The Treatment of Some Chemical Industry Wastes." Sewage Works Jour., 17, 3, 330 (Mar., 1945).--#6

Harlow, I. F., and Powers, T. J., "Pollution Control at a Large Chemical Works." Ind. Eng. Chem., 39, 572 (1947).--#7

Ettinger, M. B., and Ruchhoft, C. C., "Removal of Phenol and Cresols from Natural Waters." Ind. Eng. Chem., 41, 1422 (1949).--#8

Ettinger, M. B., and Kroner, R. C., "The Determination of Phenolic Materials in Industrial Wastes." Proc., Fifth Indus. Waste Conf., Purdue Univ., Series No. 72, p. 346 (Nov., 1949).--#9

Carpenter, C. B., and Mathews, W. W., "Industrial Problems of Water Contamination." Midwest Eng., p. 2 (Oct., 1948).--#10

Carpenter, C. B., and Mathews, W. W., "Industries Treating Wastes in Lake County, Indiana." Sewage Works Eng., 19,532 (Oct., 1948).--#11

DISCUSSION

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Mr. Mathews has presented a very comprehensive and significant paper. To some of us in industry, however, its greatest significance is not in the technical data revealed, but in the fact of cooperative endeavor on the part of a city and one of its industries toward the solution of a local, but also widespread, problem.

He has shown that the Gary municipal sewage plant can treat ammonia still wastes very successfully. The questions remaining are: "Will such a project be undertaken?"; "If so, when?"; and "What action is to be taken?"

Successful pollution control nationally is going to call for a great deal more of this type of cooperation between municipalities and their industries.

To those engaged in large-scale destruction of phenol, there seems to have been a considerable lack of interest in, or perhaps understanding of, the biological oxidation of phenol. This large-scale experiment is, therefore, an encouraging sign, as is also the interesting laboratory work of A. Henderson, of the Hydrotechnic Corporation. Such work will no doubt give welcome assistance to those who may be confronted with similar waste treatment problems.

It should be emphasized that biological oxidation of phenol is accomplished quite easily with ordinary soil bacteria and does not require a specially developed culture as some people have been led to believe. It has been found that phenol is one of the most readily oxidized organic compounds. With well-seeded dilution water, the 5-day B.O.D. of phenol will be very close to the theoretical 2.38 p.p.m. per part of phenol. This can be confirmed by an oxygen consumed test, although any test which does not completely destroy phenol is of limited value. For treatment of phenolic wastes, it is believed advisable to design a plant on the basis of complete oxidation.

Mr. Mathews' paper does not discuss the preservation of samples for analysis, and it can only be presumed that the determinations made were accurate. It should be pointed out that, in working with wastes of this type, special precautions must be taken to inhibit bacterial oxidation in stored samples in order to prevent erroneous results. Spot samples taken through the treatment plant, incidentally, are an excellent check on results of composite samples.

With two or three exceptions, the writer is in general agreement with Mr. Mathews' conclusions. Specifically, exception would be taken with regard to his conclusions on solids build-up, effects on gas production, and air requirements.

Considering the Gary experiment as a whole, it is believed that a misjudgment was made in apparently pre-supposing that certain modifications in process would be necessary in handling the ammonia still wastes. Because certain modifications were made before any phenolic wastes were received and continued throughout the experiment, it has still not been proven whether or not the plant could handle these wastes in normal operation. Nor has the experiment shown the degree to which modifications, if any, are needed.

Specifically, it might be noted that the plant was evidently prepared for the still wastes by increasing the concentration of solids in the aeration tanks substantially above normal. Had the plant been left in normal operation instead, then the quality of the effluent in terms of phenol would have indicated if and when more solids were needed and a determination of the amount needed could then have been made. Samples taken through the aeration tanks would have demonstrated how and where the phenol disappeared in the process. Also, it is quite probable that 90 percent of the phenol was oxidized in less than 30 min.

As a matter of fact, the writer believes that no build-up of solids was necessary; that the normal concentration was ample to handle the additional wastes satisfactorily. This view would seem to be supported by the fact that, although the daily loadings of phenol varied widely, the phenolic content of the effluent was consistently low. It seems to be supported, also, by the experience reported on December 4, when the solids concentration was out of balance. Solids were only 473 p.p.m., whereas they were apparently being carried at an average of about 2,500 p.p.m.

On that day, it was noted that 1.7 lbs. of phenol, or about triple the usual amount, was discharged in the effluent. On the face of it, this might appear to be a tremendous drop in efficiency. However, if looked at from the viewpoint of phenol destroyed, it becomes quite another matter. The average daily phenol input for December was 432 lbs. If December 4 can be assumed to have been average, then the plant on that day removed 430.3 lbs. of phenol, even though the mixed liquor solids were less than one-fifth of their average concentration for the month. In other words, the drop in efficiency was actually very slight.

The results of the Gary experiment showed a decrease in gas production during treatment of the still wastes. However, this might have been due to garbage or other factors, such as sulfates or detergents. Since it is known that phenol undergoes complete destruction under anaerobic conditions, there is no justification for such a conclusion in view of the lack of conclusive supporting data.

Mr. Mathews made an interesting statement when he said that loadings of 35 lbs. of B.O.D. per 1,000 cu. ft. of aeration capacity could be used. The writer is of the same opinion, but the loading depends on the rate at which the waste can be oxidized. In the experiment at Gary, the period of highest loading in terms of pounds of B.O.D. per 1,000 cu. ft. of aerator capacity was also the period of highest suspended solids in the clarified sewage. This is very significant and should not be falsely interpreted to mean that an equivalent loading in true solution could be oxidized, unless the rate of oxidation was the same as the previous rate of removal. If the loading were expressed as pounds of B.O.D. oxidized per 1,000 cu. ft. of aerator capacity per hour of aeration, it would take into account the rate of oxidation. The day of so-called false loading mentioned by Mr. Mathews was indeed a false loading, which was subsequently removed to the digesters.

Mr. Mathews was very observing of his activated sludge process but experience has shown that a "poor-looking" activated sludge is not necessarily an indication of something wrong in the process. On the contrary, some of the best results have been obtained with gray, drab sludges. Also, cloudiness of the effluent could be the result of over-aeration, as well as underaeration.

The air requirements of a sewage activated sludge plant and an industrial wastes activated sludge plant can vary considerably. This is evidenced by the necessity of maintaining 3 p.p.m. of dissolved oxygen at the end of aeration in the former, whereas in the latter, excellent operation and results can be obtained with less than 0.5 p.p.m. of dissolved oxygen. As a further comparison of activated sludge plant information, the following data are presented from operating experiences at Midland. The activated sludge plant for treatment of phenolic wastes uses 4,000,000 cu. ft. of air per day in the treatment of 15 to 20 m.g.d. of waste. This is equivalent to 0.20 to 0.25 cu. ft. of air per gallon of waste treated. With a waste flow of 16 m.g.d., the aeration period is 80 min. based on the total flow through the aerators. Rate of sludge return is 35 percent. The suspended solids in the mixed liquor are maintained between 1,000 and 1,500 p.p.m. with a sludge index of 50. The plant oxidizes 4 lbs. of 5-day B.O.D. per 1,000 cu. ft. of air. This is equivalent to 67 lbs. of 5-day B.O.D. per 1,000 cu. ft. of aeration capacity, or 250 cu. ft. of air per pound of B.O.D. satisfied. The aeration efficiency (pounds oxygen demand satisfied per pound oxygen blown X 100) varies from 16 to 22 percent.

It should be emphasized that the above data are in terms of B.O.D. satisifed, instead of removed, because the activated sludge process in sewage treatment is a method of removing B.O.D., but not a process of complete oxidation, as some of the load is transferred, via the waste activated sludge, to the digesters for final destruction.

The experiment at Gary demonstrated the feasibility of treating ammonia still wastes by the activated sludge process. However, the conclusions drawn by Mr. Mathews in regard to mixed liquor solids concentration and air requirement are open to question until definitely proven. In view of the experiences at Midland, the writer must disagree with him. However, much can be learned from experiments in the laboratory, and it is hoped that Mr. Mathews can continue his good work and that all can share in his future findings.

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(At this point, oral presentation continues.)

Unfortunately, at that time it was not possible to work out an arrangement for this method of disposal. Hopefully, we may eventually reach an agreement.

Early last summer a survey of all Gary Steel Works sewer outlets was begun to determine the extent of contamination contributed by the various operating areas. The survey indicated that the Coke Plant sewers were one of the major contributors. As a result, an intensive survey was then started of one of the Coke Plant sewers with an outflow of approximately 45,000,000 gallons per day and is still in progress, attempting to identify the cause by extent of pollution from each facility or process. Hopefully, by identification of the contaminant from each facility and process, we then start to determine remedial action.

Spent pickle liquor disposal: "Pickling" (slide 27) in steel mill language refers to the immersion in diluted sulphuric acid solution by which steel rids itself of the oxide film which has formed during cooling.

The reaction of acid and scale gradually reduces the strength of the solution and this spent sulphate liquor presents the disposal problem.

Continuing research over many years has yielded many processes which promised high efficiency disposal but none has proven practical in full-scale operation except the disposal of the liquor in wells drilled to a depth far below the water table--the level of water that may be drawn upon directly for community use or that might find its way into adjacent streams.

With the approval of the Indiana Stream Pollution Control Board, the deep well injection method of waste sulphuric acid disposal has been adopted.

This drilling crew (slide 28) is winding up a 43-day water conservation assignment. They have just completed a 7-inch well 4,000 feet down into the Mt. Simon Sandstone Strata which will absorb the plant's spent sulphuric acid wastes.

This solution to the stubborn spent pickle liquor disposal problem was developed after geological studies established that deep well injection in the Mt. Simon strata would not impair the quality of ground or surface water.

Our engineering people worked closely with Indiana's Stream Pollution Control Board in the design and installation of this deep injection well and, at the Board's request, provided test boring samples throughout the drilling. The well will be in operation, providing complete disposal of spent pickle liquor, by late 1965 when lagooning will be discontinued.

Treatment of chemical wastes: Waste segregation for maximum control efficiency is a basic guide line of our over-all waste treatment program. A good example is this (slide 29) drawing of a waste acid treatment plant. It is nearing the construction stage now and will be operating by late 1965.

This new treatment plant will neutralize acid and caustic wastes from No. 5 and No. 6 tinning lines and the nitric and fluoride wastes from the stainless steel pickle lines. The widely varying acid wastes from these processes have one common characteristic: All of them are effectively treated by lime neutralization. In their own treatment, the caustic wastes will also be useful in neutralization of the acids.

This plant, which will occupy a site adjacent to our new deep injection well, was designed in close coordination with the Indiana Stream Pollution Control Board.

Sanitary waste treatment: The City of Gary's Municipal Sanitary Waste Treatment Plant, which treats the wastes of all U. S. Steel Gary facilities, except the Universal Atlas Cement Plant which provides its own treatment, illustrates our community wide approach to water conservation.

Every resident of the Gary district, of course, has a stake in this treatment plant. We're reminded of our personal interest when the bill arrives.

We incorporate Gary's treatment plant as part of U. S. Steel's treatment story because we have three important links to this modern plant. First, as a major taxpayer, we shared in its construction costs.

Second, between 1948 and 1952, we constructed separate sewer lines from our facilities to the treatment plant, segregating sanitary wastes from both storm and process waters. Our investment in this arrangement of our intricate sewer line complex involves a civic benefit by preventing storm water from flooding the treatment plant.

Interest No. 3: As users of the plant, we pay a significant part of its operating costs.

Our community-wise approach to water conservation is working, beyond question, to the benefit of everyone in Gary.

We have presented this rather comprehensive review of industrial waste practices at our Gary plants in the hope that as conferees, you will gain a better understanding of the problems and the type of things we have done to solve them. As I have indicated, all the facilities that have been constructed in recent years in our Gary plants have very efficient water treatment controls installed as a matter of routine. This has been done not only to comply with the requirements of the Indiana Stream Pollution Control Board, but also in compliance with the Nationwide policy of U. S. Steel to provide adequate waste treatment on new installations.

As I am sure the conferees are well aware, the cost of installation of waste treatment facilities in an industrial plant, like those in the steel industry, can be very high--particularly when it is necessary to install equipment on facilities that have been built a number of years in the past.

In recent years, the Indiana Stream Pollution Control Board has intensified its program to have water treatment facilities installed at all industrial locations and they have put themselves on record that they expect a rapid acceleration in the development of such facilities in the years ahead. U. S. Steel, like all industry, has accepted the program of the Indiana Board in the spirit in which it has been formulated. We believe that they are qualified by knowledge and experience of industrial practices in their State to see that this program is carried to its logical conclusion.

As I have indicated, treatment facilities are not only costly to install and costly to operate, but do not result in any increased production or advantages. Some members of the Indiana legislature have recognized this fact and are promoting legislation which would provide for exemption from certain state taxes in cases where facilities used for water treatment purposes are installed.

I have appreciated this opportunity to discuss with you the industrial waste control practices of U. S. Steel at its northwestern Indiana plants. The interest that you have taken in my remarks is deeply appreciated. I hope that what I have said has been helpful to you as you seek to determine the size and scope of any interstate water problems which may exist in the Calumet area.

CHAIRMAN STEIN: Thank you, Mr. Howell.

Are there any comments or questions?

MR. POSTON: I would like to ask Mr. Howell if he intends to make a statement at a later date concerning the Southworks Plant of United States Steel. Is this anticipated?

MR. HOWELL: I am prepared to do that if requested.

MR. POSTON: I see.

MR. KLASSEN: I was interested in a couple of points

Mr. Howell; principally it centers around your pickle liquor problem.

Do I understand that all your pickle will be discharged to this disposal well by 1965?

MR. HOWELL: Yes, sir, from the Gary facilities.

MR. KLASSEN: And the next two may be more for personal information.

The newer process of descaling is mechanical descaling, is that it?

MR. HOWELL: Descaling and high pressure water separation. Yes, sir.

MR. KLASSEN: Yes, and this scale then will be handled in the normal settling sedimentation?

MR. HOWELL: Yes.

MR. KLASSEN: Out of just--Another out of personal interest. I have seen what you successfully did at one of your Illinois plants on pickle liquor to protect the lake in Waukegan and it is quite a novel process.

I am wondering why this wasn't applied here. Was this a cheaper method, a better method? Wasn't your waste at northern Indiana amenable to the same process?

MR. HOWELL: The answer to that, Mr. Klassen, is the Waukegan facilities generate something less than 20 percent of the amount of pickle liquor generated at Gary, and it would not be practical to use that solution at Gary.

MR. KLASSEN: Also, getting into the area of money, I was interested because we work with a number of Atomic Energy installations and know the high percentage of waste costs.

Have you just a round, rough figure of what percentage of the capital investments in the City of Gary works has gone into waste treatment?

I know these figures don't mean much, but I mean in percentages, is it 1, 2, 3?

MR. HOWELL: I am sorry, sir, I can't answer that. I don't know.

MR. KLASSEN: One last question.

This is an observation. I was particularly interested in, I think it was the second very fine picture you had here of your new works and I was particularly interested in the tall derrick and this boom that extended way up into the sky.

I wondered whether I detected a piece of pie on the end of it?

(Laughter.)

MR. HOWELL: That is possible.

CHAIRMAN STEIN: Any more comments or questions?

MR. LANE: Mr. Chesrow.

CHAIRMAN STEIN: Colonel Chesrow.

MR. CHESROW: Yes, please.

You referred to all that United States Steel has been doing in contributing to the economy of the country, rails, bridges, skyscrapers.

Those are fine. I don't think you are devoting, and it was brought out as you were asked what percentages go into just plain people that make all this possible. We've got to give due consideration to the time off that these people have. Now, it's been borne out that we are getting pollution into the lake and we are getting it into Illinois.

The beaches in Indiana and the beaches on our South Side of Chicago are closed due definitely to polluted water.

Now, the statement is a very, very fine one; but the problems of getting rid of the actual polluted material -- you have a dredge in the Grand Calumet to remove this blast furnace flue dust that you speak of, that's fine.

Now, a good percentage of that is coming down into, as a pollutant, into our Lake Michigan.

Wouldn't it be possible to set up a sediment basin and avoid that flowing down the Grand Calumet and avoiding this so-called derrick that you have permanently set up there to remove all of this?

MR. HOWELL: I think I brought out in my statement, sir, that my report on flue dust recovery is not reported as the final action. This, we are studying.

MR. CHESROW: Well, you are devoting, again you are making such an extensive study on development, in enlarging your plant facilities, I think more time and effort should be given to enlarging your pollution problem facilities.

MR. HOWELL: Well, sir, you made the statement that a large percentage of this flue dust flows down the Grand Calumet some 12 to 14 miles and then north and gets into the lake.

I don't agree with that. I think in years past this was partially true. In recent years, the Army Engineers, I think, have determined that very little of this flue dust gets into the Indiana Harbor Ship Canal from the Gary facilities.

MR. CHESROW: Well, in your Indiana book you discharge indirectly into Lake Michigan; process waste waters are discharged into the Grand Calumet.

Benzol condensates are discharged to the River.

Is any processing done prior to their going into the Grand Calumet?

MR. HOWELL: Definitely, my report covered this.

MR. CHESROW: But the Indiana book here, Indiana Stream Pollution Control book does not qualify the statement.

I am reading from this book, "Benzol condensates are discharged to the river."

"Untreated Waste waters to the Grand Calumet River."

MR. HOWELL: The facts are, sir, when each facility was installed at Gary by United States Steel, entirely adequate controls were installed at that time for the production loads that we experienced at that time. And in accordance with the technology at that time.

I stated that the facilities in all cases are not adequate today and that our production increases--Or our waste treatment control have failed to keep pace with our production increases.

MR. CHESROW: Well, thank you.

Yes, I was going to--You answered my next question by going at this in reverse and you have answered that very well.

One other question--What do you consider unreasonable pollution?

Here in your statement on page 6 it says, "The Indiana Stream Pollution Control Board has set forth on September 6, 1963, by Mr. Blucher Poole, the Board's Executive Secretary: 1. Unreasonable pollution be abated as soon as possible."

Is there a set standard for what is considered reasonable and what is considered unreasonable?

MR. HOWELL: Well, certainly that is not my language. I didn't make that statement.

I am quoting; you will have to ask somebody else.

MR. CHESROW: But, the standard has been set for your corporation and your following the standard?

MR. HOWELL: I know of no such standard.

MR. CHESROW: Thank you.

CHAIRMAN STEIN: You have another question?

MR. CHESROW: I was going to ask if I could have a -- Would it be possible to get a copy of the standards set forth by Indiana as far as reasonable and unreasonable pollution?

MR. POOLE: I don't know if we have one, Colonel, as far as reasonable or unreasonable is concerned.

We got one simple standard which I would be happy to send to you. I think in connection with this, just to clarify the air, that I think there is still some unreasonable pollution coming from the Gary works of United States Steel, Mr. Howell, oils --

MR. CHESROW: What is reasonable? He is refering to you, Mr. Poole, in all due respect to you --

MR. POOLE: I think reasonable, Colonel, is pollution that does not damage another beneficial water use.

In other words, I don't happen to subscribe to the theory that you keep every drop out, but I think you must keep out enough that you do not damage other beneficial water use.

MR. CHESROW: Not to belabor the subject, but what I am pointing out is that he does refer to the rule set forth on September 6 of 1964 that are their guide lines.

No other questions.

MR. POSTON: I would like to ask Mr. Howell, if, in connection with his pickle liquor well, would you have stand-by treatment in the event that your well fails to function?

MR. HOWELL: Yes, sir. We will have a second well plus a lime neutralization plant.

MR. POSTON: I see. Those will be available. It is similar to what Inland proposed.

MR. HOWELL: Yes, sir.

MR. POSTON: Do you agree with the figures on waste discharges in the Grand Calumet River as shown in the Public Health Service report?

MR. HOWELL: Mr. Poston, we have no scientifically reliable data as to water analyses except on newer facilities that I have shown on the slides.

MR. POSTON: Then, you wouldn't question the discharges as posed in the Blue, February report of the Public Health Service?

MR. HOWELL: No, sir, I do not.

CHAIRMAN STEIN: Any further comments?

MR. POSTON: I don't think so.

MR. CHESROW: I have one.

CHAIRMAN STEIN: Yes, Colonel?

MR. CHESROW: Do the figures reported in our bible here, the Blue Book, so-called Blue Book, 1,700 pounds of cyanide per day. Is any effort made to recover, treat or dissipate the cyanide?

MR. HOWELL: No, sir.

MR. CHESROW: Where does that 1,700 pounds per day go, please?

MR. HOWELL: Goes to the river, of course.

MR. CHESROW: Grand Calumet?

MR. HOWELL: Yes, sir, it was found in the river by the Public Health Service.

MR. CHESROW: I am wondering if this cyanide is a contributing factor. The other day we heard about the fish and birds on Lake Michigan.

Cyanide being the most deadly poison we

have, I wonder whether this is a contributing factor to the poisoning of the loons and the birds and the ducks that have been referred to in excess of 10,000. If so, I am surprised that nothing is being done to abate the amount of cyanide that goes into the river.

MR. HOWELL: As I said in my statement, we are making an extensive survey at the moment and we are studying this problem.

MR. CHESROW: But, you still proceed to build bigger and better plants to roll out more steel to build higher skyscrapers but this affects the little man, the man on the street, and that's who we are interested in.

I thought that the purpose of this session was to protect the people and it is in that interest that I am directing my questions and especially to the chemicals that are being dumped into our waters.

These figures are correct, you accept them as being correct?

MR. HOWELL: I am not in a position to comment on the Public Health Service report, since we have no knowledge as to the technics of sampling, duration, location, method of analysis, et cetera.

MR. CHESROW: They may have been received from somebody at your organization, your engineers and your chemists. I don't think these were picked up --

MR. HOWELL: No, sir, the Public Health Service got these figures themselves.

MR. CHESROW: Well, from somebody?

MR. HOWELL: From analysis of the river.

MR. CHESROW: Came up with the factor that you are dumping 1,700 pounds of cyanide a day?

MR. HOWELL: That's a calculated figure based on a sample taken at a bridge.

MR. CHESROW: Could it be more?

MR. HOWELL: It could be less, I am not in a position to say.

MR. CHESROW: Thank you.

CHAIRMAN STEIN: Are there any further comments or questions?

(No response.)

If not, Mr. Howell, thank you.

I want to commend you. It seems to me you are the ideal type of witness for anyone.

I have never seen a combination of more exalted rococo and industrial prose as was in your statement and yet such plain answers to questions.

The combination is wonderful.

MR. KLASSEN: Mr. Chairman, this is a meeting for the common people. Just use ordinary language, please.

MR. POOLE: American Oil Company, Mr. R. C. Mallatt, is Director of the Technical Services. He will make the presentation.

MR. MALLATT: Mr. Chairman, distinguished conferees, ladies and gentlemen:

My name is Russell C. Mallatt. As Technical Service Superintendent at the Whiting, Indiana, refinery of the American Oil Company, I am here to present a brief summary of our Company's program and facilities for improving the quality of effluent water. My discussion will cover both our Whiting refinery and the Calumet Nitrogen Products plant at Hammond, Indiana.

The principal points that I shall make are two:

First, American Oil has demonstrated its interest in the purity of public water in practical ways. In 1948 we spent several million dollars on facilities for the treatment of wastes in the effluent water at the refinery, and in 1960 we spent more millions of dollars on additional facilities for the same purpose. Beyond that, we have spent considerable sums on research in the complex problems of water quality control.

These were not investments made with any hope of earning a profit on them. They were expenditures made to protect the quality of Lake Michigan water.

Second, despite this spending of time and money and energy, we are under no illusion that we have completed our job in this important area. We have plans already in the works for further improvements, some of which will be brought to realization within the current year.

The need for improvement in the quality of public water is obvious. We ask only that any proposal for obtaining the needed improvement should be demonstrated to be in the public interest and should be technically and economically feasible.

Most of the research leading to the construction of waste treatment facilities at each of our several refineries has been carried out at Whiting. We have found that effluent quality control is a complex business, and technical and economic considerations have resulted in the development of a unique solution to the problems at each location.

At Whiting, we use the Bio-Flotation process, which I shall describe in some detail after presenting a brief summary of our present effluent treating facilities and pertinent background information.

The American Oil Company refinery at Whiting, Indiana, has a crude oil processing capacity of 207,000 barrels a day and produces a complete line of petroleum products. Process and cooling water is pumped from

Lake Michigan at a maximum rate of about 140 million gallons a day and is returned to the lake after treatment.

Most of the water is used only for cooling. Ninety to one hundred millions of gallons a day are recirculated through cooling towers and reused. All sanitary sewage is routed to the Hammond sewage treatment plant--none enters the lake in our effluents. I would, of course, like to stress this point.

Process water is gravity settled in a large, modern oil-water separator of API design and then routed to the bio-flotation process for secondary treatment prior to being returned to Lake Michigan. Cooling water is handled in a separate collecting system and API oil-water separator.

Construction of the Whiting refinery began in 1889. Until 1924, spent cooling water, process water, and sanitary sewage from the refinery were handled in a common collecting system and the combined effluent received primary treatment. Thus, we have also had some form of treatment.

In 1924 a separate collecting system for cooling water was installed, and in 1934 the carrying capacity of the process water collecting system was greatly expanded. In connection with this expansion, a large new oil-water separator of API design was constructed to provide additional protection for Lake Michigan.

Water quality requirements had grown as the crude running capacity of the refinery increased, and the years 1941-43 saw appreciable further expansion of the refinery to produce 100-octane aviation gasoline, toluene, and other material vitally needed in the war effort.

Despite war-time restrictions on manpower and materials, we began work on a major expansion of our waste handling facilities, developing these plans in cooperation with the Indiana Board of Health, engineers with whom we have always had the finest and most effective working relationship.

Engineering was completed and construction began as soon as the Government would permit use of materials for such a project. Sixteen pumping stations and a good many miles of collection systems were installed and on December 13, 1948, a large, modern API oil-water separator, consisting of 34 units and covering about 4 acres of ground, was completed and placed in operation. The new separator handled process water, the former separator was placed in spent cooling water service and all sanitary sewage was routed to the Hammond sewage treatment plant. This is the facility mentioned earlier that was constructed in 1948.

With the startup of the new facilities, we undertook on our own initiative a comprehensive review of all operations within the refinery, as part of a continuing good-housekeeping program. Sixteen monitoring stations were provided as a means of exercising control over the quality of process and cooling water discharged to the collecting systems within the refinery.

These monitoring stations are automatic.

Permanent monitoring stations were also installed on the two effluent streams, process and cooling water, being discharged to Lake Michigan. Equipment at these stations collect composite samples over a 24-hour period and analysis of the samples provides a measure of the quality of our effluents.

For many years a separate Reclamation Department has operated the conservation and waste treatment facilities within the refinery and has assisted other departments in improving the quality of both air and water. About 1949 management instituted a long-range research program aimed at evaluating processes for secondary water treatment at Whiting and other locations.

From 1950 to 1955, our technical service staff studied the applicability of many conventional treatment methods to the further purification of refinery effluents. These studies included laboratory and pilot plant work, some on a very large scale, on chemical flocculation, trickling filters, activated sludge, biological treatment in oxidation ponds, chlorination, ozonization, and other processes. All of these processes were found to have definite limitations for use at Whiting.

However, as an outgrowth of this extensive research, we developed the essentially new process, which we call bio-flotation. This process, which we have protected by patents, embodies the principles of sedimentation, biological oxidation, and air flotation. The process features a novel means of aerating water by means of rotating water wheels or brushes.

The air is impelled into the water as a myriad of fine bubbles, which provides maximum surface area and efficient oxygen transfer. The new secondary treatment facilities, placed in operation at Whiting in 1960, are of this type. These are the facilities mentioned earlier which were constructed in 1960.

Our present lakefront treatment facilities are shown in Figure 1--Are shown in the first slide, if we may have it, please.

Spent process water is carried from the refinery through a large underground collecting system and enters the modern oil-water separator, shown in the center of the figure, through a bar-screen located at point

"A". The purpose of the bar screen is to remove any large pieces of solids which may have entered the collecting system.

The water is then distributed among the 34 compartments of the oil-water separator. Each compartment consists of a primary and secondary stage and each stage provides almost two hours of retention time at present flow rates. The compartments are equipped with mechanical skimmers or flight scrapers to recover the separated oil from the surface and remove separated solids from the floor of the compartments.

The oil and water removed from the surface is transferred to a large rectangular basin shown between the parallel roadways near the center of the separator.

From this collecting basin, oil and emulsions are transferred to four emulsion treating tanks shown at the right-center. Oil from emulsion treating is returned to the refinery; the water is returned to the separator. The sludge, which is removed from the bottom of the separator compartments, is transferred to the vertical tank at the left end of the separator and processed through a centrifuge to recover occluded oil and water.

Effluent from the oil-water separator is lifted by huge pumps located in the two-story building adjacent to the separator and discharged into the reinforced concrete-walled channel, which carries it to the bioflotation basin shown in the lower left portion of the picture.

Water enters the upper right hand compartment through a distribution baffle. The first compartment provides about three hours of additional gravity settling. Facilities are available for the periodic removal of oil from the surface of this first presettling compartment of the bio-unit. The water passes from the presettling compartment over control weirs and through the mechanical aeration devices located at B, C, D and E. The retention time in each of the compartments following the aeration stages is about three hours.

Biological oxidation, additional sedimentation, and air flotation of biological solids and oil occurs in each aerated basin.

The surface skimmings are removed by a patented skimming device at point E. The treated effluent passes over a level control weir at point F, through the outfall channel, and enters the lake at a location not shown on the photograph.

Although the performance of both the primary and secondary treatment facilities has fully met our expectations, we recognize that the quality of our process water effluent can be further improved. Mere expansion of the facilities is not the answer, however. We believe that the best way to achieve further quality improvement is to reduce the load on and improve the' performance of these facilities.

The refinery has undergone rapid modernization in the last ten years. Despite an increase in the capacity of the refinery, maximum total water pumped from the lake for use in the refinery has been reduced from 260 million gallons a day in the early 1950's to 140 million gallons a day in 1964. Retirement of obsolescent process units has brought about a significant reduction in the amount of oil and other contaminants entering the refinery collecting system.

Within the next 30 days, we expect to bring on-stream a modern hydrofining unit, which will permit us to retire the acid and clay treating section of a lubricating oil dewaxing plant. This modernization step will eliminate a source of finely divided solids which have tended to interfere with operating our effluent quality improvement facilities at peak efficiency.

During the coming year, we plan to install additional aeration equipment in one or more compartments of the bio-flotation basin on an experimental basis. If beneficial results are obtained, these facilities will be made permanent.

We are also watching with interest the success of neighboring companies in the use of deep wells for the disposal of small-volume, concentrated wastes. Our own studies show that the geology of the area is highly favorable, and we are giving serious consideration to drilling a 5000 ft. deep well for this purpose. A few carefully selected wastes which have a high oxygen demand would be pumped down the well. This would reduce the load on our present treating facilities and improve the quality of water entering the lake.

Let's turn now to a very brief discussion of Calumet Nitrogen Corporation facilities.

It is pertinent to point out that the plant began operations in 1956 as a joint project of Standard Oil Company (Indiana) and Sinclair Refining Company. The facilities are operated by personnel from American Oil's Whiting Refinery.

At present, the plant produces a maximum of 450 tons per day of ammonia, a part of which is converted to nitric acid for subsequent use in the manufacture of ammonium nitrate solutions, which are in turn blended with ammonia and urea to produce a variety of agricultural chemicals. To provide a permanent solution to the problem, an agreement was worked out with the City of Hammond to send the most contaminated wastes to the municipal sewage plant for treatment.

A tie-in to the Hammond sewer system was completed in July 1964, and contaminants entering the Indiana Harbor Ship Canal from the Calumet Nitrogen Corporation plant have been greatly reduced. The data in Table VI-5c of the February 1965, Public Health Service report on Illinois-Indiana water pollution were, as the report itself says, taken before this connection to the Hammond sanitary sewage system.

These, then, are the two points that I said at the outset I would make: First, American Oil has demonstrated by major expenditures on research and facilities and considerable success in results, its practical concern with improving the quality of public water. Second, we recognize that there is room for further improvement in our facilities and operations, and we are studying steps to insure that improvement.

We hope that future water quality goals will be established on a technically sound and reasonable basis.

Some questions in this area still need answers: What, for example, are the proper and practical quality requirements for the different uses of water? What are reasonable water-quality goals for Lake Michigan? Where will they be applied?

Through active participation in the work of the Technical Committee of the Great Lakes-Illinois River Basin Project, our company has tried to contribute to the answers to these and other pertinent questions.

Unfortunately, this important work is not yet completed, and I for one would hope that no precipitate action will be taken before the results of this careful study are in and can be fully evaluated.

Now, although the foregoing concludes my formal remarks, I would like to address a few comments to the recommendations in Section 9 of the Public Health Service report that pertains to industry.

Recommendation #1 pertains to further exclusion or treatment of wastes by industrial plants.

Ours is a continuing program and the additional steps which we have in progress and under study are consistent with meeting the objectives of this recommendation.

Recommendation #2 pertains to permanent programs of sampling plus submitting effluent quality reports to the appropriate State agencies.

We have been doing essentially this for the past 18 years.

Recommendation #3 pertains to appropriate state or local agencies establishing a system for monitoring the quality of public waters at strategic points.

In the past we have made our own limited surveys of the quality of lake waters and would be glad to cooperate with the Stream Pollution Control Board in any program that may be deemed appropriate.

In conclusion, I would like to show five or six colored slides to give you still a better understanding of the scope of our operations.

This is a general view of one section of the refinery showing its proximity to Lake Michigan. The units which you see in the foreground are cracking units essential for the production of gasoline and 28 associated vapor-recovery units, the cooling towers from which the water vapor is rising are, of course, an essential part of our water reuse program.

I think I probably should get in a plug for our effective air pollution control also. In this slide you will notice the air over the refinery is quite clean.

Can we have the next slide, please?

This is an aerial view of our waste treatment facilities. It is quite similar to the one you saw presented by the Public Health Service on the first day.

Near the top of the slide is the API

separator which is used for processing our cooling water.

This slide does show something that the previous one did not; namely, the bay into which our effluent discharges.

You will note here there is no free-floating oil to create an unsightly appearance either in this slide or the one shown by the Public Health Service on Tuesday.

I am rather proud of the appearance of our refinery effluent.

May we have the next slide, please?

This is a close-up view of one end of the biological treatment facilities and shows in some detail the location of three or four areas of aeration equipment and shows the effervescent--The water inside the pond is considerably deeper than outside.

You notice the lightening in color as it goes through the treatment process.

Next slide.

This is a close up view showing some detail on the aeration devices which are employed. This equipment is capable of putting in of the order of 40 pounds of oxygen per linear foot per day, we got 720 linear feet of the things so you can see we are putting in a tremendous amount of oxygen for purification purpose.

Next slide.

This is the final slide and I inserted it simply to give you a better feel for the size of these facilities. You are looking now at the presettling compartment with the water-entry canal coming in from the lower right-hand side. The gray and purple boxes at the end are electrical control equipment for the pumps, sumps, and other equipment associated with the operation.

I believe that is all of the slides.

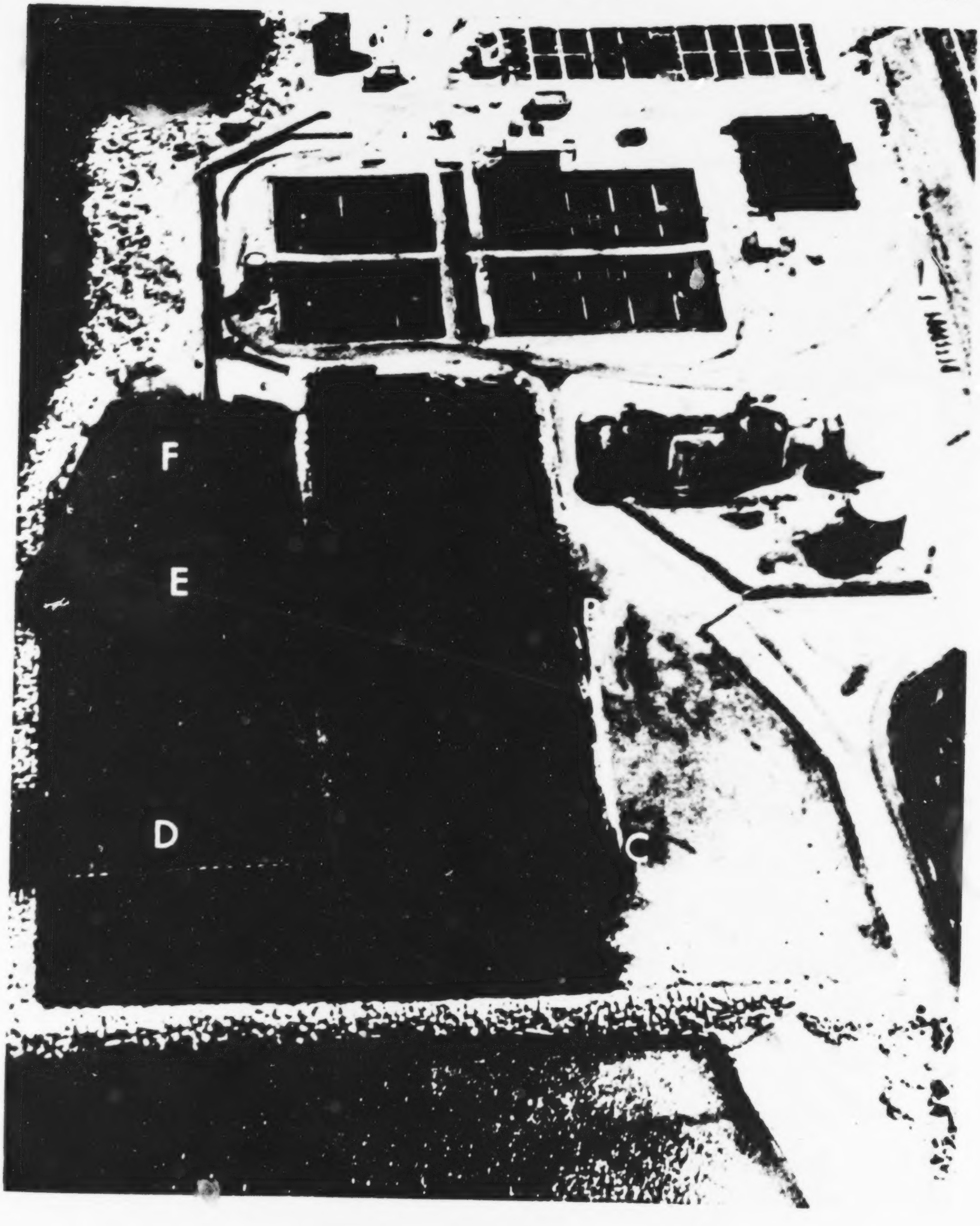
Now, in addition to the facilities which I have discussed and shown, we, of course, do carry out a number of additional, highly beneficial, programs and good housekeeping practices which have been mentioned by others but not named specifically in my report.

For example, we also seal most of our spent caustics and we return all our spent acids and acid sludges to the processor for recovery.

We have ballast water handling facilities and separators in our dock area and so on. These are actually not named in the report but we have them.

Mr. Chairman, this concludes my presentation unless there are questions.

CHAIRMAN STEIN: Thank you. Are there any comments or questions?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MR. KLASSEN: I wanted to ask Mr. Mallatt when, specifically referring to Calumet Nitrogen on page 19, I think of the Indiana report, it indicated that your waste waters from the American plant plus your cooling water blow-down is discharged to a separation basin.

Is this the waste that now goes to Hammond?

MR. MALLATT: Yes, the bulk of that does now go to Hammond.

MR. KLASSEN: In other words, the waste from the ammonia plant plus your cooling tower blow-down goes to the Hammond area?

MR. MALLATT: Mr. Klassen, what we have done there is to divert to Hammond the blow-down waters that contain the predominant amount of ammonia nitrogen and total nitrogen alone. They were shown in that tabulation.

Actually, these amounts have been reduced about 80 percent, they are 20 percent of previous values and we have additional plans which will make another 30 percent reduction.

MR. CHESROW: What is the oil concentration at the effluent of the bio-flotation process?

MR. MALLATT: You are talking about concentrations of oil, you have to define your analytical--In order that we are talking on a common basis with the Public Health

Service report and use a pH method which is the one used by the Public Health Service report.

The oil concentration on a total average basis would be of the order of 10 to 15 parts. If you are talking on a few parts per million of oil, this is not in any sense floating oil but it will impart at most a slight florescence to the water. The figures I quoted are combined, which is consistent with the--

MR. CHESROW: Parts per million would be 10?

CHAIRMAN STEIN: Ten to 15.

MR. CHESROW: One other question.

MR. MALLATT: Somewhat higher on the process water, some lower on the cooling, the cooling water is probably four to five parts per million.

MR. CHESROW: You have done a fine job in reducing the water from 260 million gallons per day down to 140.

I was wondering if any thought had been given to recirculation?

MR. MALLATT: We are recirculating about 100 million gallons through cooling towers which were shown in one of the slides.

MR. CHESROW: How about the balance, does that go-- That goes into Lake Michigan?

MR. MALLATT: That is right.

MR. CHESROW: I'm just wondering.

MR. MALLATT: The amount of so-called contaminants in our cooling effluent are so very low they do not constitute a problem.

I mentioned in our cooling tower, our oil concentrations are probably of the order of four to five parts per million by the APH.

Our suspended solids are also very low and when you have this situation, it certainly is not justifiable to practice additional recirculation.

Your cooling exchangers, so on, in the refinery are designed for water at certain temperatures; in connection with new units we do give consideration to the relative merits of additional cooling.

MR. CHESROW: Thank you, my thought was to try to prevent even that effluent from going to Lake Michigan.

CHAIRMAN STEIN: Are there any further comments?

MR. POSTON: Mr. Chairman, I would like to ask Mr. Mallatt whether he disagrees with the figures of the amounts of waste discharged as shown in the Public Health Service report of February that applied to the American Oil Company.

I did note in one place he indicated a change.

I mean, at the time this test was made, these figures compared with your results.

MR. MALLATT: I would have no reason for taking exception to these data, Mr. Poston. I think they quite probably could have been the values on the sampling day involved.

In other words, they fall within the normal range of probability for the quality of our effluent.

All right.

MR. POSTON: Now, one other question that I would like to ask concerns the taste and odor problem that is occasioned at the South District Treatment Plant of the Chicago Water Department. They indicate that one of their greatest problems comes from hydrocarbon type odors, and I wondered whether--I realize that there are other refineries and other sources for this, but, I wondered whether you would care to comment on this as to what this might consist of, how this might be traced a little better to the actual sources.

This has been a very difficult problem from the standpoint that nobody, no one knows what it is and the analytical procedures for collecting the small amounts involved are also difficult.

I wondered if you would care to comment on that.

MR. MALLATT: I believe that the Public Health

Service presentations shows very clearly that the bulk of the oil does not come from oil refineries.

Therefore, I think it is a little unfortunate to refer to this as refinery type odor.

Oil is oil regardless of the source.

CHAIRMAN STEIN: Are there any further comments or questions?

You know, there is one thing I wondered about.

You said at American Oil, before you put that effluent in Lake Michigan, do you run that through a "final filter"

MR. MALLATT: I have to confess we do not.

(Laughter.)

CHAIRMAN STEIN: Thank you.

MR. POOLE: Next is American Maize-Products and Dr. G. H. McIntosh, who is Chief Chemist for the Company. He is going to make their presentation.

DR. MCINTOSH: Mr. Chairman, members, and conferees, ladies and gentlemen:

My name is George H. McIntosh. I am Chief Chemist-Quality Control of the American Maize-Products Company, Hammond (Roby), Indiana, on whose behalf I am speaking today.

American Maize-Products Company is a

manufacturer of starches and syrups, and we derive these principal products from corn as the raw material. Our plant was built in 1907, and is located in Hammond, Indiana, although our post office address is Roby.

The plant is located approximately 2,000 ft. from the south shore of Lake Michigan.

We have a 36 inch fresh water intake 2,200 ft. off-shore and a 36 inch outfall back into the lake about 800 ft. off-shore. We pump an average of 11 million gallons of water from the lake each day of operation, and return to the lake as cooking water an average of 9 million gallons. The 2 million gallons that are retained are treated in our water treatment department and are used by our power department, in certain stages of our process.

The process that we employ to derive starch from corn and to isolate the other components in the kernel is called the wet milling process, and this process is typical of what is sometimes termed a "bottled-up" system.

The essential components of the kernel of corn are the germ, which contains the oil, the gluten, starch and fiber. Relatively large volumes of water are used in the process, first to steep the corn, which in turn softens it and facilitates the separation of the kernel's components; second, to slurry the material after grinding and thus to have the water used as a vehicle for transporting the material through the various stages of process; third, as cooling water; and fourth, for manufacture of steam by the power department.

The primary objective of our entire process is to isolate the starch. The germ, gluten, and fiber are considered by-products, although they have valuable uses.

The starch, which comprises about 76 percent of the corn kernel on the dry solids basis, is washed free of solubles and is either processed to dry starch products, or converted to corn syrups. Fresh water enters the system only for washing the starch in the final stage, and about 10 gallons of water is used in this way for each bushel of corn ground.

A plant processing 50,000 bushels of corn per day will produce about 500,000 gallons of process waters which have to be concentrated by evaporation. The raw water required to condense the vapors in the evaporation will approach 3 to 4 million gallons per day.

Another 4 to 6 million gallons of raw water is required in the concentration of the corn syrup. It is in the concentration of these liquors that traces of the product are carried to the condensing or cooling waters.

At this point I would like to touch on some of the highlights in our experience with waste control. In 1940 sanitary sewage facilities were made available to the plant by the Hammond Sanitary District, and from that time on--about 25 years, now--no sanitary sewage has been included in the waters that we have returned to Lake Michigan.

In 1944, we launched an extensive waste abatement program that spanned a six year period, and which incorporated these major improvements in our in-plant systems and methods:

The isolation of all waste-bearing waters;

The reuse of process waters;

The recovery of all solids possible by tightening up of losses at their source.

This phase of our over-all program was completed in 1950, at a cost approaching 1 million dollars, and with the result that our daily plant loadings in the cooling waters to Lake Michigan were reduced approximately 92 percent.

In 1952, we started a plant modernization and expansion program that essentially converted our operations from a batch type process to a continuous stream process. An outgrowth of this operational transition was the development of more waste waters than could be handled by the waste abatement program that we had just completed about a year or two before.

Extensive research was carried out to determine the best way to handle these waters. We ultimately evolved an idea that led to the creation of an original two-stage lagoon system on our property for the bacteriological reduction of much of our industrial wastes. Ten acres in size, it consists of an anaerobic first section covered with Syrofoam insulation followed by an aerobic second section employing mechanical aeration. The Styrofoam insulation on the anaerobic section raised the average yearly efficiency of the system from 68 percent overall to 88 percent overall.

I will not go into detail on this aspect of our experiences because our exhibits, which I will submit at the conclusion, will contain detailed descriptions of the lagoon operations.

The latest phase of our plant modernization program was completed in June 1964, with the virtual completion of an electronically controlled continuous conversion syrup refinery. Since 1952, we have spent more than $20 million on plant modernization of which $700,000 went directly for waste abatement. This large capital investment has had a most beneficial effect on our waste control efforts. Furthermore, during this same period, the plant capacity has been increased 40 percent. The volume of water required has not increased due to the conservation program we have followed.

In connection with our day to day efforts in waste abatement, we have a modern laboratory, with a chemist and two senior technicians assigned full time to the Industrial Waste Program. In addition, we have one man assigned full time to "in-plant control" of product losses.

Chemical analyses are made each day, seven days a week, of the cooling waters returned to Lake Michigan, and a bacteriological analysis is made five days per week. The volume of these waters is accurately measured and recorded, the temperature is recorded, and the waters sampled by a continuous sampler. The cooling waters we return to Lake Michigan are chlorinated and contain absolutely no sanitary sewage.

In addition to this outfall sampling, we have 33 sampling stations throughout the process, 14 of which are on the cooling water lines connected to the Lake Michigan outfall. These stations have continuous samplers, and the principal ones have volume recorders. The samples are collected at eight hour intervals, and are analysed daily, seven days per week. The annual operating costs for Industrial Waste Control is now approximately $130,000 per year.

Our 1965 Industrial Waste Control Program calls for several corrective measures that should make for considerably more improvement. The program calls for a surface condenser for a large evaporator, a clarifier for the waters going to the lagoon, the increasing of the lagoon's capacity, and the diverting to the lagoon of some condensates from the cooling waters now going to Lake Michigan. Thus, our continuing capital program for waste abatement will total approximately $170,000 for this year 1965 and we expect to reduce the reported load in our cooling waters going to Lake Michigan by 50 percent or more.

From the very beginning of our waste abatement program our policy has been to work closely with the Indiana Stream Pollution Control Board and the Hammond Sanitary District. Both of these agencies have received monthly reports of our daily operations, and both agencies have been very helpful to us in our work.

Our program for pollution control and water conservation has been part of our operations for a long duration. Our management has had a deep-rooted and serious interest in the problems connected with water conservation and the fostering of beneficial programs in the control of industrial waste. The program has never taken on the character of a short-term expediency to meet some fleeting problem, but rather has been established deeply and permanently with us as a continuing and essential phase of our over-all operations for today and the days to come.

As evidence of the work we have done at American Maize-Products Company in the field of waste abatement, we submit the following publications as part of this statement:

A reprint from INDUSTRIAL AND ENGINEERING CHEMISTRY, Vol. 44, March 1952, entitled, "Corn Products Manufacture." This reprint gives a detailed account of the waste abatement program that was started in 1944 and completed in 1950.

A reprint from the January 1964, issue of GOOD PROCESSING Magazine entitled, "Year Round Lagoon Operation." This reprint describes the lagoon operations at American Maize-Products Company.

A brochure entitled, "Lagoon Treatment of Corn Wet Milling Wastes." It gives a detailed discussion of the Anaerobic-Aerobic lagoon treatment system in operation at American Maize-Products; also, much analytical data and the costs of operations.

CHAIRMAN STEIN: Dr. McIntosh, if it is agreeable with you, these three will appear as exhibits and not part of the transcript. The references will be there and since this is a readily available published material I think they can refer to it if they wish.

DR. MCINTOSH: Briefly, in summary:

Since 1940, twenty-five years ago, all sanitary sewage has been sent to the Hammond Sanitary District.

Between 1944 and 1950 we put into effect a waste abatement program costing almost 1 million dollars which reduced our loadings to Lake Michigan approximately 92 percent.

Since 1944 we have had an active research program including a laboratory devoted solely to industrial waste and water conservation.

Between 1952 and the present time we have raised plant capacity 40 percent with no increase in water demand.

We maintain a 365-day-per-year, around-the-clock monitoring system on incoming, in-plant and out-going waters.

All cooling waters returned to Lake Michigan are chlorinated.

The annual operating cost for Industrial Waste Control is now approximately $140,000 per year.

Since 1940 our capital expenditures specifically for waste abatement and control have totaled 1.7 million dollars and we expect our expenditure of $170,000 this year, 1965, to reduce the loadings in our cooling water going to Lake Michigan by 50 percent or more.

Our management policy in this entire problem has been and will continue to be one of full cooperation with all agencies.

CHAIRMAN STEIN: Thank you, Dr. McIntosh.

Are there any comments or questions?

MR. KLASSEN: One on the percentages, Dr. McIntosh.

You say reduce it by 50 percent. We are getting more and more that we like to have some actual figures and I say this because in the Indiana presentation on page 25 it says, "The ultimate objective of the company is to produce a plant effluent with a .5 population equivalent per bushel of corn processed."

Was this correctly stated, would you say?

DR. MCINTOSH: Yes, sir, that is the terminology that has been used in the corn industry as population loadings in terms of bushel of corn ground.

MR. KLASSEN: Population equivalent?

DR. MCINTOSH: Per bushel of corn ground in reference to this we might say that this figure of 44,000, we already report our figures in pounds of B.O.D. and C.O.D. and this 44,000 the report we accept as being very accurate.

MR. KLASSEN: The reason I bring this out is .5 population equivalent first of all, it's good to see that you recognize population, the term population equivalent and also, the East Chicago and Hammond plants, I believe are reducing their load there, 95 percent which gives them a .05 population equivalent.

Yours is.5 and theirs is .05 and I am just wondering about the objective of the American Maize as compared to what the cities are doing.

DR. MCINTOSH: Well, I better restate that.

Ours is as I say in the corn industry we have reported it in terms of bushels of corn processed and it's a five-tenths of a population equivalent per bushel of corn.

Now, you want to go back to the pounds of B.O.D., that 44,000 will represent about 7,400 pounds of B.O.D.

We will reduce that, we hope over 50 percent. We are quite sure, we want to be a little conservative.

CHAIRMAN STEIN: Any other further comments or questions?

(No response.)

If not, thank you very much.

Before we go on, there are one or two announcements.

One, on Tuesday, I understand to avoid involvement with the admission charge which might be required for the boat show, it is suggested that you enter through the north entrance which is up in that direction, although I suspect we have had meetings in conjunction with boat shows before, we suggest that entrance at the time we are calling the meeting, to avoid too much confusion.

However, if you do run into a problem, we have a liaison man, Mr. Tom Keller.

Would you stand up, Tom?

If you have any problem with the boat show or get involved with them and want to be sorted out and come to us, ask for Mr. Keller and he will handle it. Sometimes it gets to be a very big operation.

MR. KELLER: May I remark?

In 214 we have an exhibit from the United States Public Health Service.

CHAIRMAN STEIN: Now, we have several statements which have been submitted for the record.

One is by Charles Sandor, Superintendent, Department of Water Works Hammond, Indiana. He will put it in the record as if it were read.

MR. SANDOR: The City of Hammond, Indiana, owns, maintains and operates a complete waterworks system. The waterworks system includes a complete and modern water filtration plant which employes the latest conventional methods and equipment in water treatment. The Hammond Water Department's obligation is to provide a safe and satisfactory water to its patrons; to the towns of Munster, Indiana; Highland, Indiana; Lansing, Illinois; and to the Peoples Water Company of Black Oak, Indiana. A total of 75,000 people as well as many industries depend wholly on the Hammond Water Department for its water.

The Hammond Water Filtration Plant is located on the south edge of Lake Michigan at Calumet Avenue and Lake Front, Hammond, Indiana. The water supply is taken from Lake Michigan. The three water intakes which supply water to the filtration plant lie within the basin formed by the southernmost end of Lake Michigan.

The City of Hammond began operating the waterworks in 1891. In the period from 1891 to the 1930's, the only treatment required to provide a safe and satisfactory water was chlorination. In the early 1930's the water often was unpalatable mainly due to pollution.

A water filtration plant was built and placed into operation in 1936. Although the degree of pollution in the water supply was constantly increasing from 1936 to the early 1950's, the water filtration plant was able to provide a safe and excellent quality water for its consumers.

Since the early 1950's there has been an accelerated degradation of the quality of Hammond's raw water supply. A definite pollution problem exists and it is becoming more and more difficult to produce a safe and satisfactory water. An analysis of the records of the Hammond Water Filtration Plant indicates the severity in the increase of pollution at Hammond's water source.

Pure water is practically tasteless and odorless. However, when pollution is introduced into the water, disagreeable odors and tastes in a water supply result. The most common causes of disagreeable tastes and odors result from (1) micro-organisms, either alive or dead, (2) dissolved gases, (3) mineral substances, and (4) phenols and other tarry or oily wastes.

Hammond's raw water supply usually contains a combination of causes for disagreeable tastes and odors and very frequently there are two or more distinct types of taste and odors in the raw water at the same time. Very likely, the raw water that the Hammond Water Filtration Plant is forced to accept through its intakes is second to the poorest in quality of any water treatment plant using Lake Michigan water.

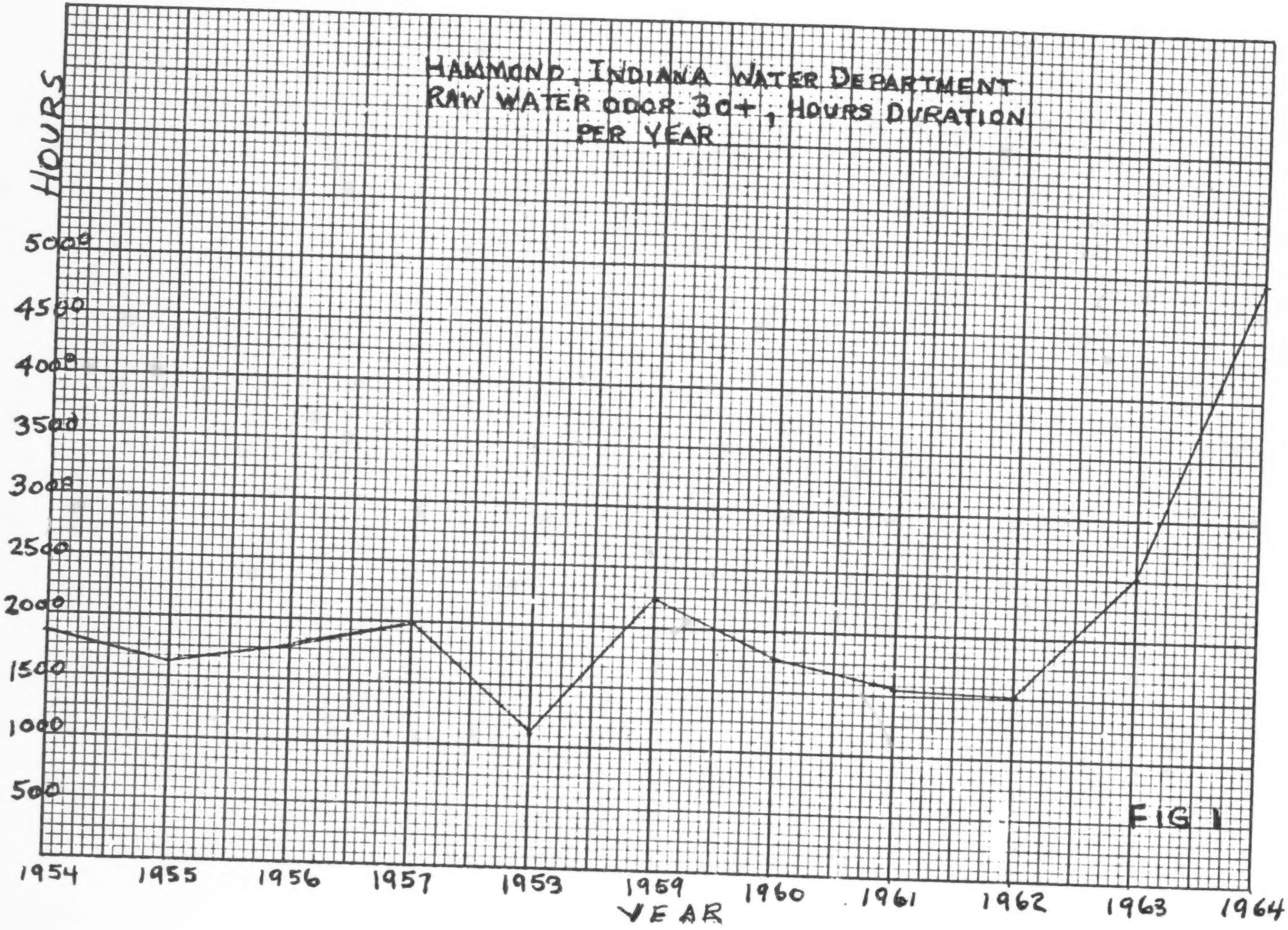
Let us take a look at the increasingly poor quality of Hammond's raw water during the last eleven years. A dramatic parameter to illustrate this is the threshold number.

The qualitative and quantitative determination of odor adopted by the American Public Health Association is the threshold number. This method is used by the Hammond Water Department. Generally speaking, the higher the threshold number, the more pollution is present, and the more intensive treatment and greater amount of chemicals are required to produce a finished water which is both safe and satisfactory. Please bear in mind, where Lake Michigan water is relatively pollution free, the threshold number barely exceeds 3 or 4.

Three charts pertaining to the duration of raw water odors have been prepared from the records of the Hammond Water Filtration Plant. Figure 1 pertains to the duration in hours when the raw water had a threshold odor of thirty and over. This graph shows that: (See Page 1300)

The raw water in 1964 was by far the poorest quality ever recorded by the Hammond Filtration Plant.

The duration in hours for the year 1964



HAMMOND, INDIANA WATER DEPARTMENT
RAW WATER ODOR 30+, HOURS DURATION
PER YEAR

FIG 1

amounted to 4,966 or 56-1/2 percent of the time;

The 1964 total is an increase of 98 percent over the previous record year of poorest quality water which was in 1963 when odors of 30 and over existed 2,511 hours;

The 1964 duration is 279 percent greater than the yearly average for the preceding ten years.

Figure 2 pertains to the duration in hours when the raw water had a threshold odor of fity and over. The graph indicates that: (See Page 1302)

The duration in hours for the year 1964 existed for 2,688 hours or 30 percent of the time;

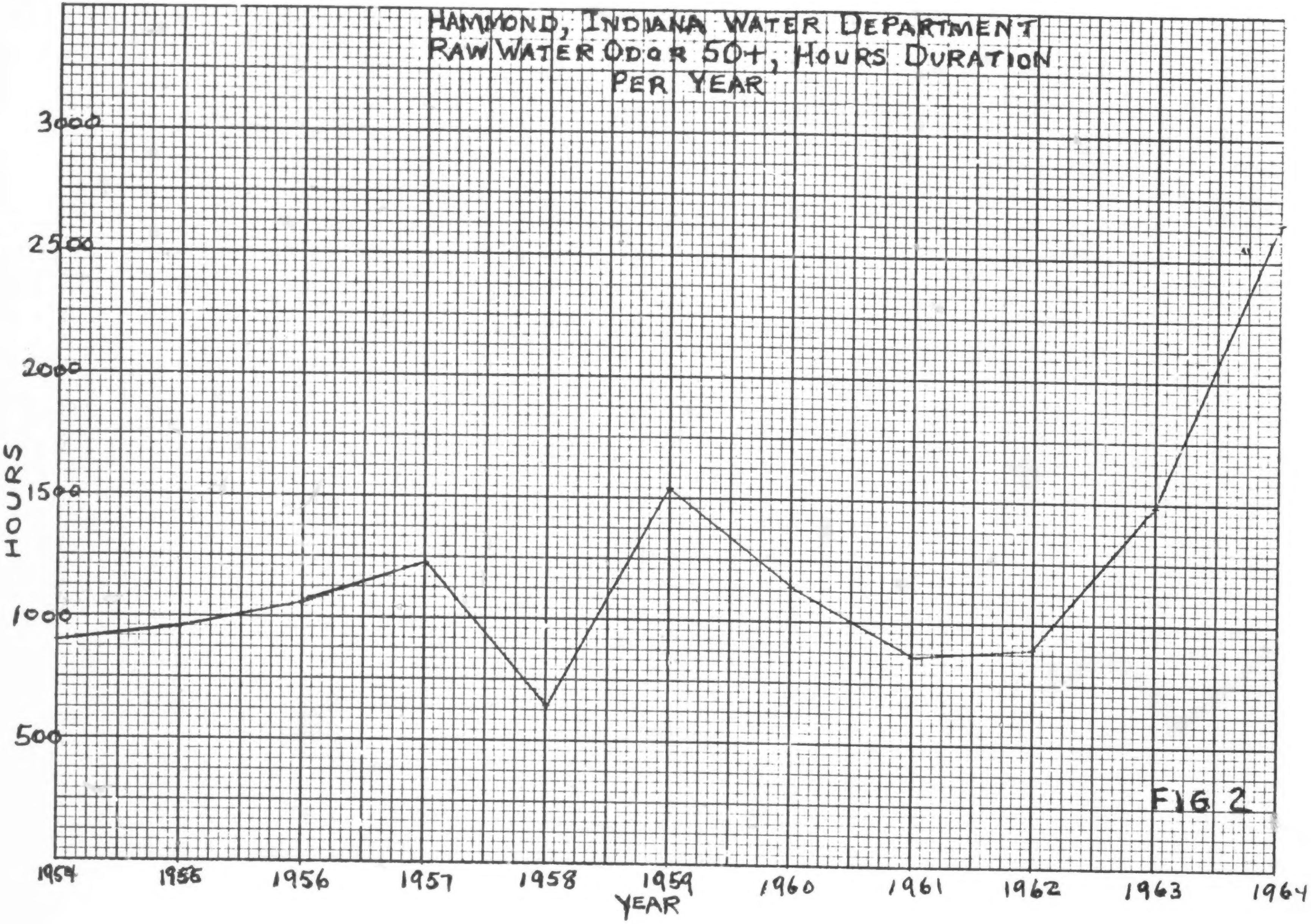
The 1964 total is an increase of 73 percent over the previous record year 1959 when odors of 50 and over existed for 1,544 hours;

The 1964 duration is 248 percent greater than the yearly average for the preceding ten years.

Figure 3 pertains to the duration in hours when the raw water had a threshold odor of one hundred and over. The graph points out that: (See Page 1303)

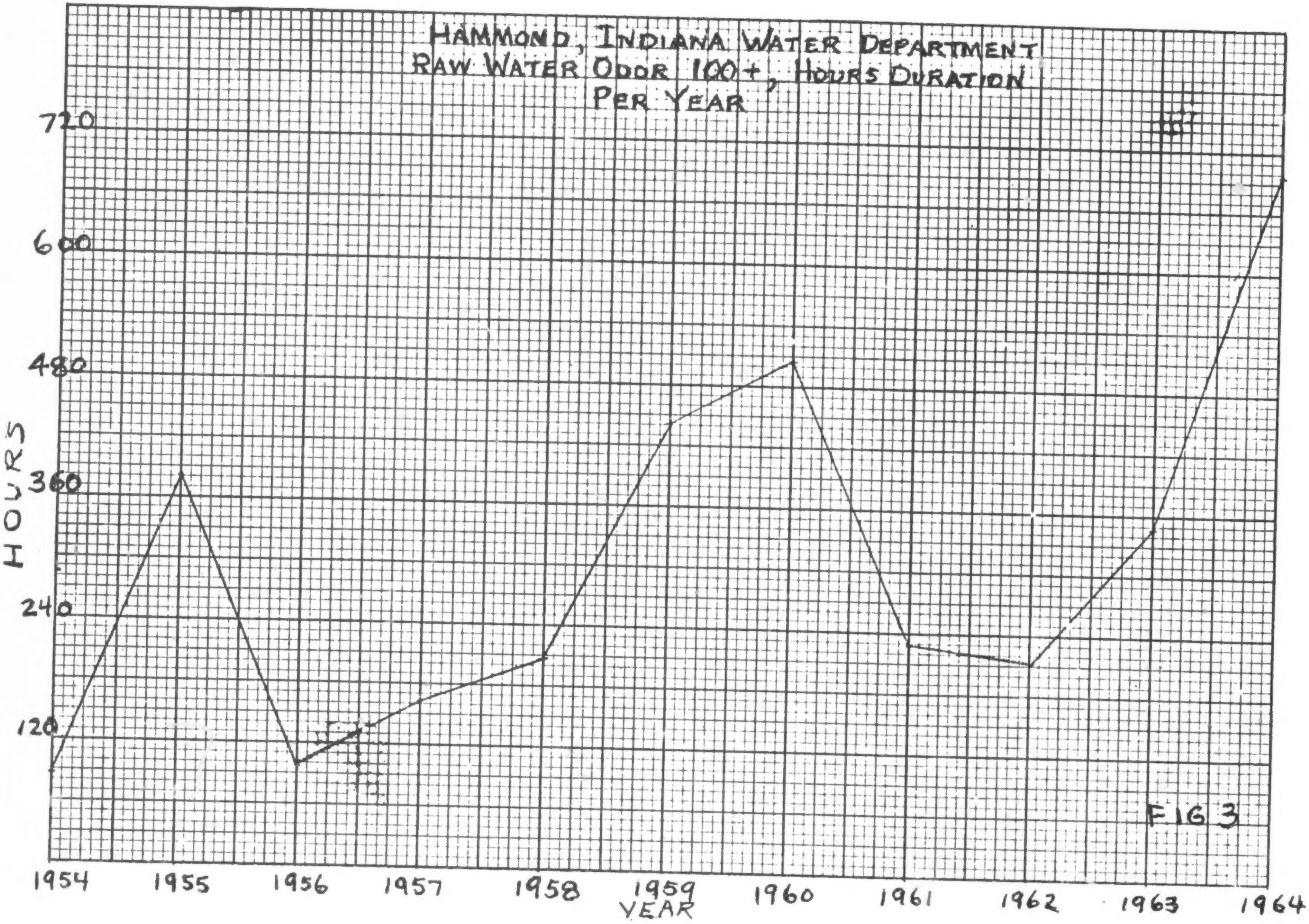
The duration in hours for the year 1964 existed for 698 hours;

The 1964 total is an increase of 38 percent over the previous record year in 1960 when odors of 100 and over existed 504 hours;



HAMMOND, INDIANA WATER DEPARTMENT
RAW WATER ODOR 50+, HOURS DURATION
PER YEAR

FIG 2



HAMMOND, INDIANA WATER DEPARTMENT
RAW WATER ODOR 100+, HOURS DURATION
PER YEAR

FIG 3

The 1964 duration is 262 percent greater than the yearly average for the preceding ten years.

The following observations may be made from the graphs:

The average raw water is rapidly becoming poorer in quality;

The instances of poorest quality raw water is occurring more frequently and for greater hours in duration;

There are some dips in the graphs; these dips may well be attributed to the years of slight economic recession and/or to temporary or token pollution abatement efforts.

The pollution which strains the Hammond Water Filtration Plant the most are the phenols and oily wastes, sewage and plankton.

The phenols and the oily wastes give the greatest problems. Very often these industrial wastes travel in slugs. The filtration operators are trained, schooled and skilled. They must practice everlasting vigilance because a slug might enter the water intakes at any moment. The operators take **threshold** number odor tests and make phenol tests hourly. When the water is extremely poor, tests are taken every twenty minutes. It is only because the filtration operators are evervigilant, skilled, diligent and because of the high dosages of chemicals used that the quality of water entering the distribution mains is safe and of satisfactory quality during these peak pollution periods.

Chemical dosages per million gallons of water run extremely high when these peak pollution periods exist. Activated Carbon is usually fed into the raw water at a rate of 40 pounds per million gallons of water at 10 **threshold** number odor when sewage or plankton type pollution is present. Carbon has been fed into the water at a rate of 1,200 pounds per million gallons of water at 600 threshold number odor when phenol pollution existed.

At times the industrial pollution is so great that all the activated carbon slurry that the pumps can feed into the raw water is not ample. In these cases, additional carbon is added on top of the filters in order to complete the chemical requirement. We are wondering what will happen to the quality of our finished water if this pollution is allowed to continue and if this pollution is allowed to increase.

The Hammond Water Filtration Plant is located such that it rarely escapes heavy pollution. When the wind is from the south, the sewage pollution greatly increases with the duration of the southerly wind. When the wind persists in the east and northeast, large amounts of oil type pollution and phenols are expected from the industries east of the Hammond Water Filtration Plant. When the wind direction is from the west for an extended period, the Hammond Water Filtration Plant receives sewage pollution and industrial pollution beginning from the second or third day of west wind, and greater concentrations exist until the wind changes direction. This pollution coming in with an extended westerly wind undoubtedly comes from the Illinois side of Lake Michigan.

Only when there is a strong north wind does the pollution diminish in the Filtration Plant's raw water supply. The fresh water from the north pushing in displaces and dilutes the polluted water.

When there is an ice cover extending from the shore past the intakes, pollution increases alarmingly. The water movement is restricted, there is little air contact with the surface of the water and the pollution becomes more and more concentrated; there are records of twenty to thirty days of constant and increasing pollution occurring before the ice moved out.

To sum it up the quality of raw water at the Hammond's water source was excellent between the years 1891 and 1925, satisfactory between the years 1926 and 1945, poor between the years 1946 and 1955, and very poor quality between the years 1956 to 1965. The quality level of the period 1926-1945 should be restored and maintained.

The effect of the degradation of the present water quality is that it is becoming very difficult to produce a safe and satisfactory water using the present conventional equipment and chemicals and employing the present conventional water treatment methods.

The Hammond Water Department respectfully requests that the Conferees initiate steps which would improve the quality of water in the receiving basin of the Hammond Water supply. The Hammond Water Department further recommends the establishment of water criteria for municipal water sources in the lower end of Lake Michigan and also recommends that the water quality criteria encompasses the development of the maximum limits permissible under various parameters of quality for municipal water sources which, after conventional treatment, would produce safe and quality water supplies.

CHAIRMAN STEIN: We have a statement from the City Hall, East Gary, Lake County, Indiana, from Mr. Paul Wagner, the East Gary City Engineer.

MR. WAGNER: Gentlemen:

The City of East Gary is aware of the necessity of abatement of pollution sources, and our plans are pointed in such direction.

We also realize that while our involvement in the pollution problem is small, we still would be expected not to increase the problem by any lack of effort on our part.

A survey of our disposal system can be summarized as follows:

The establishment of a cumulative sewage disposal fund in about the year of 1952. At that time the Town was partially sewered, with raw sewage discharged into the Burns Ditch.

By 1956 work was started on construction of sanitary sewers, which at the present time is approximately 70 percent complete. Disposal was started with the first phase of the sanitary system by intercepting the original raw sewage discharge into Burn's Ditch and provided a delivery system to the Gary-Miller Disposal Plant.

The Gary-Miller Disposal Plant is operated by the City of Gary. The East Gary sewage is processed through this plant on the basis of number of households served. The treated sewage is discharged into Burn's Ditch. The present East Gary sanitary system includes old combined sewers as well as recently constructed sanitary sewers, which at times of heavy runoff causes overflows into the Burn's Ditch.

The City of East Gary proposes to continue the Tax Levy providing for the cumulative disposal fund and thereby allow for the construction of storm sewers to relieve the heavy load on the combined sewers.

With no problem of industrial wastes contributing to the pollution of our outlet, that is, the Burn's Ditch, our plans are to either acquire the Gary-Miller disposal plant, or in the event of the abandonment of the said plant, to connect our outlet with the Gary sanitary system in the Northwest area of our town. The latter proposal would largely eliminate our pollution of Burn's Ditch except for some discharge of diluted sanitary flows contributed by our combined sewers.

East Gary is populated largely of one-family dwellings, located in the area along and south of the Michigan Central Railroad. At the present time with no industrial development, our City has a low assessed valuation, which results in one of the highest tax rates in the State of Indiana. Our contribution to the cleanup of stream pollution must necessarily be limited to availability of funds, but this does not hinder us from taking steps toward this end.

CHAIRMAN STEIN: Another presentation from the Town of Schererville, Indiana.

THE TOWN OF SCHERERVILLE, INDIANA, BY CLYDE E. WILLIAMS AND ASSOC., ENGINEERS, BY Mr. G. H. TOMBAUGH:

The Town of Schererville, Lake County, Indiana, is in the process of laying sewer pipe and building the Treatment Plant at the present time, and expect to have the plant in operation, on or about April 15, 1965. This should solve our pollution problem.

CHAIRMAN STEIN: We have a statement from the Porter County Chapter of the Izaak Walton League of America.

PORTER COUNTY CHAPTER, IZAAK WALTON LEAGUE OF AMERICA, JAMES M. FALLIS, PRESIDENT, AND HERBERT P. READ, CONSERVATION CHAIRMAN:

Mr. Chairman and Conferees:

The Porter County Chapter of the Izaak Walton League of America owns property and has its clubhouse on the Little Calumet River about 2 miles east of the junction of the Little Calumet and Burns Ditch. As residents of the area and as part of a group with a long history of interest in attempting to prevent water pollution, we have first-hand knowledge of the magnitude of the problem. We know where pollution is, some of its sources, and, most important to us, the developing and future sources of water pollution.

Federal Problem: We believe water pollution to be an interstate and therefore a Federal issue because:

The Little Calumet River watershed is in two states;

Lake Michigan borders four states;

The proposed Port of Indiana is planned for a location 1-1/4 miles east of Burns Ditch and for which Federal funds are expected;

The proposed Indiana Dunes National Lakeshore would be 1-1/4 miles east of the aforementioned port.

Since wind and current do not respect man-made political boundaries, pollution introduced into any point within the Calumet River basin or Lake Michigan can travel from one state to another. The direction of pollution travel often varies with the shifts in wind, which in turn affects the direction of water flow. The rate of fall of the Little Calumet in many areas near the Illinois-Indiana state line is so slight that wind shifts readily reverse direction of flow. While the main direction of Lake Michigan water is from northwest to southeast, a littoral drift along the shore travels back toward the west, thereby carrying any pollution present back and forth between two, three, or even four states.

Sources of Pollution--Existing and Potential:

Upstream from our property on the Little

Calumet River, the Town of Porter, Indiana, is dumping untreated sewage. The town is presently annexing much of the unincorporated area along the river, which at least simplifies the jurisdictional responsibility.

Bethlehem Steel has cut a new and very large ditch into the Little Calumet River at the Portage-Westchester line, which drains much of their plant site. We are not aware of pollution now, but the water should be regularly monitored.

At the junction of the Little Calumet and Burns Ditch, pollution enters from the west, sources of which are both municipal sewerage and miscellaneous.

Near the mouth of Burns Ditch, Midwest Steel has a large discharge pipe. At times discolorations appear in the discharge water, and we request that this source be regularly monitored. We have a colored slide of the water discoloration.

Midwest Steel is disposing of its acid-bearing process wastes into large pits. At first the pits were located on the state owned property of the proposed port. Recently the pits have been located west of Burns Ditch on Midwest Steel's own property. We request that the effect on the water table be investigated to see if there has been sufficient filtering action. We also request that future disposal plans for this waste be determined, since the pits are rapidly filling up with sediment and cannot be used indefinitely.

Bethlehem Steel plans to use a deep well to dispose of their acid-bearing process wastes. We are not satisfied with the vague assurances that future water supplies will not be contaminated. We therefore request that a more comprehensive study be undertaken.

The potential pollution due to the proposed Port of Indiana is of critical importance. One of the conditions recommended by the U.S. Bureau of the Budget and endorsed by the Army Corps of Engineers is:

"Water and air pollution sources will be controlled to the maximum extent feasible in order to minimize any adverse effects on public recreational areas in the general vicinity of the harbor."

However, no evidence of plans for such preventive measures exist. One of the users of the proposed harbor will be the Rail-to-Water Transfer Co. which now operates a coal transfer facility along the Calumet River. This is an extremely dirty operation as illustrated by the remarks of Mr. Leo Geissal, President of Rail-to-Water, as taken from the record of the Interstate Commerce Commission hearings concerning the Monon Railroad plans for a coal dock. Excerpts from Mr. Geissal's testimony are as follows:

p. 1558

Q. (By Mr. Krueger) "Mr. Geissal, when you are on the dock, as you describe in your testimony, in operation, does it produce any dust?"

A. "Well, at certain times of the year, yes, sir. Under certain loading conditions it does."

* * * * *

p. 1559

Q. "Now, what is your prevailing wind direction at your dock?"

A. "The prevailing wind at our dock is from the west."

Q. "At the time of your operation -- your dock is in operation, does this wind have any effect on the dust?"

A. "Yes, sir, it carried the dust toward the east."

Q. "You are explaining the action of the wind."

A. "And sometimes I will have to admit, the dust is pretty thick which causes a scum to form on the river."

Q. "Does that scum on the river lie dormant around the dock or does it move with the water?"

A. "It just depends on how much movement we have in the river, sir. Sometimes if there is no movement in the river the dust stays there, but when a ship comes around and agitates the water then, of course, it is carried away."

p. 1560

Q. (By Mr. Shepard) "You testified that we have no practical way of allaying the dust that you testified to at this time. That means that you don't have at Rail-to-Water any particular installation for the purpose of allaying the dust; is that correct?"

A. "I do not have."

Q. "But there are such devices in existence?"

A. "Yes."

* * * * *

The plans of the Indiana Port Commission are to transfer the existing equipment from the Calumet River to the lakefront only 1-1/4 miles west of the proposed Indiana Dunes National Lakeshore and 3 miles west of the existing Indiana Dunes State Park. Since the wind and water can carry coal dust many miles, you can understand our concern.

A review of the cost breakdown for moving and reconstructing the coal dock as shown by the Indiana Port Commission includes no allowance for coal dust control.

In addition, there is the potential problem of disposal of petroleum wastes in connection with port facilities, and of controlling discharges from ships.

We hope that this conference can take the necessary steps to control and prevent the pollution problems we have outlined here.

Porter County Chapter, Izaak Walton League of America.

James M. Fallis, President
Herbert P. Read, Conservation Chairman
M. R. Box 438, Chesterton, Indiana

Addendum:

Informal conversations with some of the coal shippers described above have indicated willingness to incorporate coal dust controls. However, we believe that all potential harbor users should be advised that pollution controls would be expected of them, so that the costs of such installations can be taken into consideration before work is begun.

CHAIRMAN STEIN: We have a presentation from the town of Dyer, Indiana.

The statement which follows is submitted on behalf of the Town of Dyer, Indiana, by its consulting engineers for use in the conference in Chicago, Illinois, beginning March 2, 1965, regarding water pollution in the Calumet District. The statement is being made consistent with advice received by the Town officials from Mr. B. A. Poole, Technical Secretary, Stream Pollution Control Board, State of Indiana.

The Town of Dyer, Lake County, Indiana, is located on the stream of Plum Creek (Hart Ditch), some five miles upstream from its junction with the Little

Calumet River. Plum Creek passes through the built-up portion of Dyer, which comprises approximately fifteen percent of the total corporate area.

The town which is residential in character has a present population of about 4,000. During past years the town has utilized an existing system of local and sub-main sewers and drains which collect both raw sewage and septic tank effluent from residences and other buildings and discharge the same directly to Plum Creek at some 25 separated points. As the population in the developed area has increased, there has been a corresponding increase in the extent of pollution in the stream and in the degree of resulting nuisance.

Since early 1963, anticipating aid in financing through a Federal grant the Town of Dyer, through its Board of Trustees, has been engaged in efforts to construct facilities for the proper collection and treatment of the sanitary sewage, and thus eliminate the pollution of Plum Creek.

Subsequent to the earlier employment of its engineers and the preparation of plans and specifications, bids were received in December 1963 for the construction of an intercepting sanitary sewer system and a sewage treatment plant; also for a system of local and sub-main sanitary sewers connected to the intercepting sewer system, to permit the treatment of sewage from approximately 500 people in a developed area located remotely from the main built-up area of the town.

An entirely new group of town officials had been elected shortly before the construction bids were received. The new officials who assumed responsibility in January 1964 necessarily required time to become acquainted with the proposed project in all of its aspects. Construction contract awards, however, were made in early February 1964, conditioned upon receipt of a Federal grant and upon the sale of bonds to finance the project costs.

Shortly thereafter some organized local opposition to the project developed, which resulted in an injunction suit being filed against it. This delayed progress in carrying out the required legal proceedings preliminary to the sale of bonds, until early October 1964, at which time the objectors finally agreed to withdraw the injunction suit. The statutory proceedings preliminary to the sale of the bonds were completed as soon as possible thereafter, thus permitting revenue bonds in the amount of $720,000 to be sold on November 12, 1964.

Since November 13, 1964, the town has had in progress the construction of the intercepting sewer system, the sewage treatment plant and the other sewers described above. Schedules provide for completion of the construction to permit the plant and system to go in operation by September of this year.

The intercepting sanitary sewer system is located and designed to intercept the sanitary sewage from the existing sewers in the built-up areas of the town as well as that from the new sewered areas and to deliver the same to the sewage treatment plant. The intercepting sewers are designed to serve a population of approximately 24,000, thus to meet the estimated requirements at the end of an approximate 45 year period.

The sewage treatment plant is of the diffused air activated sludge-separate sludge digestion type with facilities included for the chlorination of final effluent. The plant is designed to provide complete treatment for the sanitary sewage from a population of 6,000 people. The structures and plant layout, along with the property acquired for the site all lend themselves readily to future expansion and enlargement.

It is anticipated the Dyer Sewage Treatment Works will provide a continuously responsible contribution to the Lake County Stream Pollution Control Program.

Respectfully submitted,

Besozzi, Carpenter & Ignelzi, Consulting Engineer.

By Carl B. Carpenter, Partner, Project Engineer March 1, 1965.

CHAIRMAN STEIN: We have a statement by Mr. Thomas E.

Dustin, State Secretary, Indiana Division of the Izaak Walton League of America.

(Statement)

The Indiana Division of the Izaak Walton League of America is grateful for this opportunity to address this conference. For your records, I would like to introduce representatives of several northwestern Indiana League chapters who are also present here: Mrs. Edith Adele Jensen, of Gary, and a member of the Marquette Chapter, Portage; Mrs. Beatrice Jannelle, of Chesterton, President of the Marquette Chapter, and also a National Director of the League; Mr. John Yuhasz, of Gary, and a member of the Gary Glen Park Chapter; and Mr. Herbert Read, Past President of the Porter County Chapter, and also a resident of Chesterton.

I am Thomas E. Dustin, State Secretary of the Indiana Division of the League, of Fort Wayne. Since I am not a resident of the immediate area whose problems you are considering, I would like to defer presently to Mr. Read, whose long association with the region will be useful.

However, I am not unfamiliar with the area, and have long enjoyed the natural regions of the Indiana dunes. I have also often flown over the Indiana shoreline with the specific intention of observing the extremes of its environmental condition.

On two such occasions, April and September 1963, I made many aerial slide photographs of the Indiana Lake Michigan shoreline from Michigan City Harbor on the east to Indiana Harbor on the west. I have these slides with me, and they are available for your examination. If it pleases the panel, the Indiana Division wishes to supply one set of enlargements of these slides which pertain to your purposes, and would like to send these to the Chairman for more detailed study. Many of the photographs are exceptionally detailed, and I think they will be useful.

The problems of water and air pollution are of central concern to the Izaak Walton League. We are concerned about both present and future pollution of both our cities and our remaining natural and unspoiled areas. The environmental conditions in this particular bi-state Lake Michigan border region are very probably the worst in the United States; and I say that with some previous exposure to some other port and industrial complexes from New York to San Francisco.

Specifically among the photographs I will forward (slides available at the conference) are several indicating what is probably illegal encroachment on the riparian lands of Indiana by one of the Lake County steel firms. The photograph shows a remnant beach almost entirely covered with possibly 20 feet or more of slag and other waste used for fill. At irregular intervals, the slag not only entirely covers the sand beach, but also bulges out into the lake waters. This is unquestionably a source of pollution through leaching of soluble contaminants. The irregular and patternless encroachment of this fill material into the waters would indicate that it has not been sanctioned by public authority.

Others of these aerial photographs illustrate dramatic discoloration of waters, particularly at Indiana Harbor and extending eastward along the shore to Gary Harbor, where it again becomes more intense. Since there is little if any soil silt in these particular waters, the littoral flow being sand, the discoloration is evidently chemical or other waste matter directly attributable to the manufacturing plants of that area. Some of the photographs pretty well indicate the sources, especially in the case of the Inland Steel Company works on the large artificial land fill area forming the east side of Indiana Harbor.

For your additional interest, I am attaching a copy of an investigation of this shoreline pollution published in the August 27, 1963 edition of the Indianapolis (Indiana) Times. This illustrated story indicates not only the ruin of existing recreational values, and the growing evidence of the spread of this blight, but also indicates the threat of pollution from future ports and industry on the Indiana shoreline.

While the Izaak Walton League is gravely concerned about pollution past and present, which has been going on and getting worse here for 50 years or more, it is equally or more concerned about pollution, future. If we set and stand by proper ground rules now, it will be easier to avoid the calamities which are before us.

We are not entirely satisfied with public relations claims and non-specific assurances of the newer plants in Porter County, and will not be until these are supported with well-defined and publicly understood standards. We believe it is in the public interest that such standards and commitments to them be established. Broad assurances are too subject to later interpretations.

It is our understanding that present and planned discharges from the newly established finishing mills in Porter County -- a subject entirely germane here -- largely consist of water which the industries describe as cleaner than when drawn from the lake. We have no specific cause at this time to question the claim, but it would seem quite appropriate that all these discharges be independently monitored on a regular basis by appropriate Federal agencies to assure that standards are met in perpetuity.

Establishment of such standards is especially important because the new complexes in Porter County are only in their earlier stages of development. Production of basic steel, which we understand may at some time be contemplated, is quite another matter. Those problems, and their firm solutions, should be specifically known before - not after - the fact.

It is further understood that plans of the Bethlehem Steel Company in Porter County - at least according to a recorded statement by the General Manager of the plant - include discharge of some materials into the Little Calumet River. I do not know what all of these materials may be, but would like to note that even chemically pure water can be a deadly pollutant and can biologically murder a stream if it is hot when discharged. If that is the case, it would seem wise to require that any materials, even water, discharged into this interstate stream or into other bodies of water, incapable of quick self-rectification, meet not only physical and chemical tests of purity, but also thermal and biological.

We also understand that the more lethal effluents of the new Porter County plants are being contemplated for deep-well disposal. This may be an adequate solution, and we do not specifically oppose it at this time, but it is worth asking the question if this approach is merely handing the problem to the future.

Several biologists to whom this approach has been suggested are not sure it is a wise idea. For example, I have been informed that substances below the impervious layer of that area are carbonates or lime-like. These would react with acids, and for a period of time would presumably be self-neutralizing.

However, the natural availability of these neutralizing agents is not inexhaustible, and the spread of contaminants and the eating away of the understructure would seem almost certain. The capacity of these disposal wells would probably outlive us, and might even outlive the plants, but it would seem that knowledge of the long term legacy should be determined in advance of the fact. Such massive poisoning of sub-strata could be likened to radioactive contamination, since nothing could really be done about it by the time the first evidence appeared. Curing problems of this scope at a future time could make child's play of the huge problems we have even in 1965. It would seem as much in the public interest to prevent ills as to cure them.

In May and July of 1962, a chemical settling pond was observed east of the Porter County plant of Midwest Steel Corporation, only a short distance from the edge of Lake Michigan. While specific tests were not made of this material, it was apparent from the varigated colors that the liquid was not water alone.

Seepage through the completely porous sand of that area from such practices would inevitably find the way into the waters of the lake. I do not know if this pond is still in use, and if it is not, what alternatives are being used, but I do have colored photographs of it, and these will be included in the portfolio I will forward. I have the colored slides of this, however, and would be pleased to show these to you at this time if you care to take the time.

Since it is probable that much of what remains of the unspoiled shoreline and dunes area will be established as The Indiana Dunes National Lakeshore which will be regional and National in significance, either legal or illegal pollution would seem untenable.

In closing, I would like to note one additional event which may help set an example for us in this region. I have seen a budget figure for the State of New York quoted at $1,700,000,000 for antipollution efforts alone. This figure seems so fantastic that it is difficult to believe -- and I apologize to this panel if I am mistaken. But if the figure is accurate, it cannot help being compared to almost an exact same amount which the Indiana General Assembly contemplated only a few days ago for the operation of the entire state for the next two years.

At this time, if I may have permission to do so, I would like to yield to Mr. Read, who has also prepared a statement based on his lifetime of intimate knowledge of this region.

Thank you.

CHAIRMAN STEIN: We have a statement from the City of Hobart, Indiana, submitted by Mayor Titus.

(Statement)

To: Stream Pollution Control Association

Re: Statement of Improvements during the last 12 years.

Gentlemen:

The City of Hobart, Lake County, Indiana, from July 1953 to June 1962 was served by a Primary Sedimentation type of sewage treatment plant with one 50 ft. diameter heated digester designed for a flow of 2 million gallons per day, plus facilities for chlorination of final effluent. During these nine years, the average daily flow was in the order of 620,000 gallons per day with a removal of 49 percent of B.O.D. and 61 percent of suspended solids.

In order to secure a better reduction of organic material, facilities for Secondary Sewage Treatment was added in June of 1962.

The new plant was designed as a complete activated sludge type of installation and in June of 1962 the secondary portion of this plant was completed and put into operation. Our present average daily flow is 903,000 gallons per day, a 31 percent increase over 1955.

At present, we are removing an average of 84 percent of the suspended solids and 87 percent of the B.O.D. from the sewage treated.

The cost of additions to our plant and sewer extensions since 1961 has exceeded $2.6 million. The design of additional sewers for the west side of the City of Hobart is under contract at the present time at an estimated construction cost of over $1.2 million.

It is our desire to give every assistance possible to the Stream Pollution Control Association to preserve the natural resources,health, and well-being of the Southern Lake Michigan Region.

Respectfully submitted,
Luther J. Titus, Mayor
Carl R. Boutilier, Operations Superintendent.

CHAIRMAN STEIN: We have a presentation from the City of Valparaiso, Indiana, presented by Mayor Donald E. Will:

(Statement)

The City of Valparaiso, Indiana employed O. M. Leonard & Associates to make a survey, report, and recommendations on the current and future estimated requirements for the City of Valparaiso, Indiana, in the light of the indicated expansion of industry in this area.

This report has been promised to be furnished us in the near future, but it will not be completed for use or presentation in its entirety for this March meeting in Chicago, Illinois.

The City requested Mr. Leonard to furnish a letter giving an outline of the summary recommendations. I have a copy of the Engineer's letter, and request permission to read this and use it as my report.

This letter will show that the City has already recognized the probability of a problem and has taken steps to have it analyzed, and then initiate a progressive program.

Sincerely,

Donald E. Will, Mayor of Valparaiso.

* * * *

The Honorable Mayor, and
Board of Public Works & Safety
City of Valparaiso, Indiana
City Hall
Valparaiso, Indiana

Re: City of Valparaiso, Indiana
Sewers and Sewage Treatment
Facilities

Gentlemen:

In accordance with your request we herewith present a brief resume of the data which will be presented in our engineering report and recommendations for sewerage, sewage treatment, and drainage for the City of Valparaiso, Indiana.

1. Scope of Planning: The City of Valparaiso, Indiana, is adjacent to and is a part of a large industrial

expansion in the Calumet area. Expenditures of new capital have been estimated at one billion dollars per year for the tri-county Calumet area. Valparaiso has experienced an increase in the past three (3) years of about 5,000 population in the utility area served by the City.

It is our opinion that this present population of approximately 17,000 within the 4 1/2 square miles of incorporated area, may be reasonably expected to double, and the corporate area to increase to about 14.0 square miles within the next fifteen years (1980). In addition to the anticipated increase in residential area, provision for some industrial waste treatment will be necessary for industries moving into the area.

2. Sewerage and Drainage System: The present sewerage system serving the City is a combined system. This system improved and extended in 1958 has adequate capacity for storm and waste water service to the present area of the City, and sufficient capacity for the anticipated future sanitary and waste water which will be discharged from the additional and partially developed areas now under study, provided that all storm drainage from future areas are discharged into separate storm drainage systems; discharged direct to natural drainage watercourses.

The engineering survey and report we are now preparing for the City of Valparaiso, Indiana, will show the boundaries of seven (7) separate storm drainage areas. The total area encompassed by these separate districts or areas are shown on the attached sketch drawing.

All sanitary and waste water collected in these new areas to be served by a separate system of sanitary sewers.

(a) That the operation of all sewerage systems and sewage treatment facilities be supervised by a qualified professional engineer who is a member of the Board of Public Works and Safety, or such other professional engineer employed by the Board to review and approve plans for all new construction and all proposed alterations to existing sewerage or sewage treatment facilities, and to also supervise the proper operaton and maintenance of the systems and treatment facilities.

We believe that by adoption of, and enforcement of the regulatory ordinances necessary to provide for all sanitary sewage and trade wastes from new additions to be separate, and that the supervision and operations of the sanitary sewerage system and sewage treatment facilities be made a mandatory responsibility of an experienced and technically qualified authority,that the municipality can reasonably meet the requirements imposed by the accelerated population growth and area expansion which the City is now taking place.

Yours very truly,
C. M. Leonard & Associates
Signed by C. M. Leonard

Enclosure: (Area Outline Map) (See Page 1332)

* * * *

CHAIRMAN STEIN: We have a statement by the Board of Trustees, Town of Porter, Indiana.

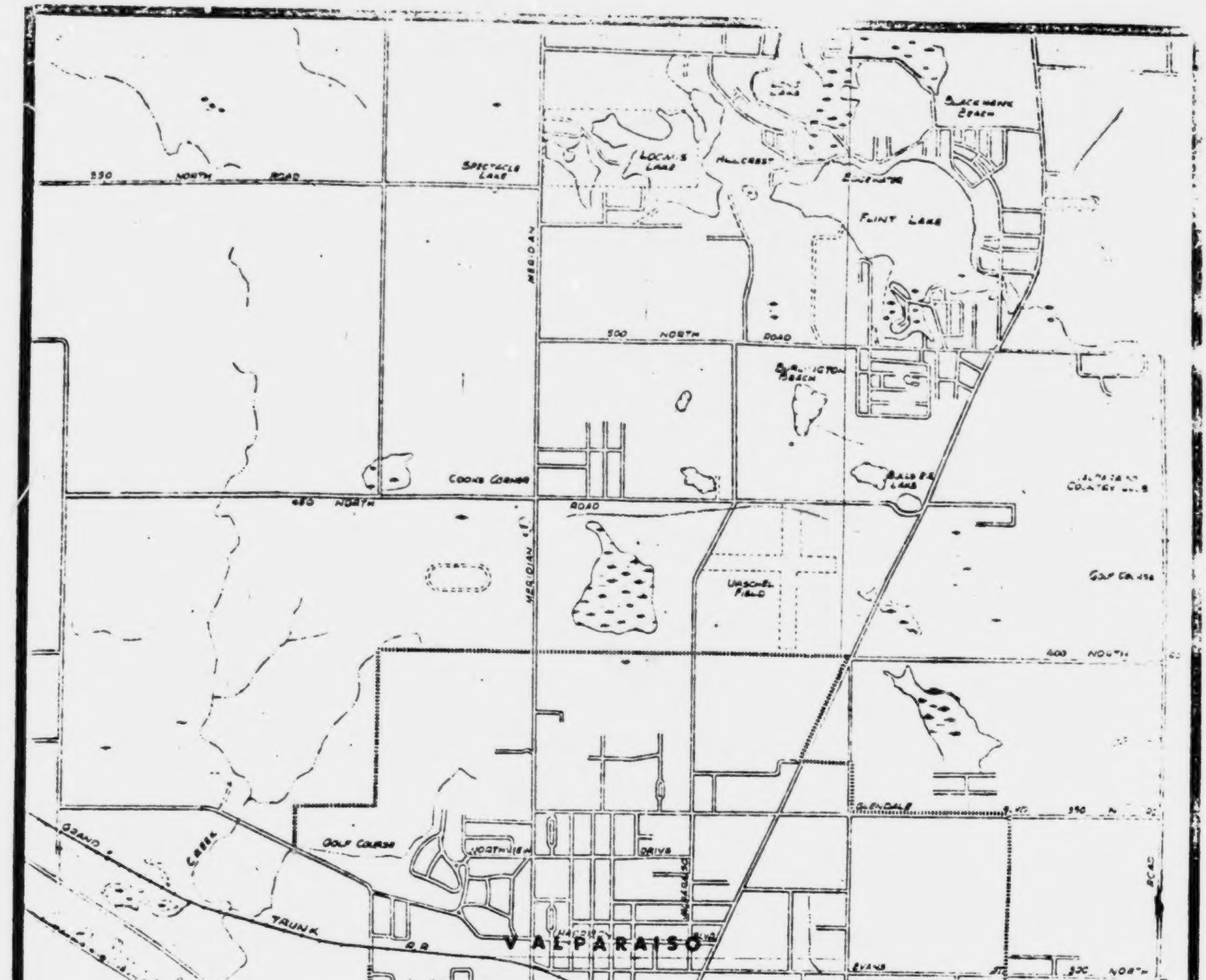
STATEMENT BY THE BOARD OF TRUSTEES, TOWN OF PORTER, INDIANA

The Town of Porter is now daily discharging approximately 65,000 gallons of raw sewage into the Little Calumet River, in Westchester Township, Porter County, Indiana.

The discharge takes place one-half mile downstream from the recently constructed sewage treatment plant now treating the sewage from the Town of Chesterton.

Chesterton's capacity far exceeds current requirements, and the two Town Boards, Porter and Chesterton, have beennegotiating a contract by which Porter would lease capacity in the Chesterton plant equal to twice Porter's present requirements. It is expected that the two towns will reach an agreement within the next three or four weeks.

Board of Trustees, Town of Porter
Signed by Thomas Wagner, Trustee.


350 NORTH ROAD
SPECTACLE LAKE
LOOMIS LAKE
HILLCREST
BLACKHAWK BEACH
FLINT LAKE
MERIDIAN
500 NORTH ROAD
BURLINGTON BEACH
COOKS CORNER
450 NORTH ROAD
MERIDIAN ST
VALPARAISO COUNTRY CLUB
URSCHEL FIELD
GOLF COURSE
400 NORTH
GLENDALE
390 N
GRAND TRUNK R.R.
CREEK
GOLF COURSE
NORTHVIEW DRIVE
VALPARAISO
EVANS
300 NORTH
PENNSYLVANIA R.R.
SALT CREEK
CHICAGO AND
SEWAGE DISPOSAL
PARK AV
CHICAGO
COLLEGE
GARFIELD
ROOSEVELT RD
0 1 2 3 4 5
THOUSANDS FEET

AREA OF PLANNING SURVEY
FOR
DRAINAGE & WASTEWATER TREATMENT
CITY OF VALPARAISO, INDIANA.
O. M. LEONARD & ASSOCIATES-ENGINEERS
-1965-

CHAIRMAN STEIN: We have the statement of Mr. Leo Louis, President of the Gary-Hobart Water Corporation, Gary, Indiana.

(STATEMENT)

As testimony presented to the conference on the matter of pollution of interstate waters of the Grand Calumet River, Little Calumet River, Calumet River, Lake Michigan, Wolf Lake, and their tributaries - March 2-5, 1965, McCormick Place, Chicago, Illinois:

I wish to refer to the 1965 Report of the United States Department of Health, Education, and Welfare on the matters discussed at this conference, particularly in regard to the comments in the report referring to Gary-Hobart Water Corporation.

On page 12, under Chapter V - Water Uses, it is indicated that we are one of the municipal water systems in Indiana which uses Lake Michigan as its source of water supply. We do have two filtration plants -- one of which was completed in 1954, and the second one now nearing completion.

Our Jefferson Park Filtration Plant in Gary is located at Seventh Avenue and Madison Street near the downtown area, and the water supply for this plant is obtained through a three mile long intake tunnel which was constructed at an elevation approximately 90 feet below lake level. This intake extends due north from our plant under the United States Steel property and ends in an intake crib located at the bottom of the lake in approximately 40 feet of water.

Water flows by gravity from the intake to our filtration plant, and the end of the intake is approximately one mile from the present shore line. This intake was constructed in the years 1906-1908 and is now reaching its design capacity during our peak days in summer months. Our records indicate the intake was designed for about 55 million gallons per day, and, in 1964, we did pump around 54 million gallons per day through our plant.

The second filtration plant, now under construction,is being built in the southwest corner of the Town of Ogden Dunes adjacent to the Inland Steel Company property. The primary reason we moved that far east was because we were unable to obtain other property and access to the lake closer to Gary.

We do not have room at the Jefferson Park location for further expansion, and we decided it would be too difficult to do with our decision to move to the Porter County site. The intake for the Ogden Dunes plant consists of a pipe line located in the lake bottom terminating in an inlet at the bottom of the lake in approximately 25 feet of water 2,300 feet from the shoreline.

The report indicates that the principal lake currents flow from east to west and from south to north in our area. Consequently, the principal sources of pollution mentioned in the report, after they are mixed with lake water, do not generally flow toward our intakes with the exception, of course, of Burns Ditch. For this reason, we have not encountered the extreme conditions noted by other water utilities.

In general, our raw water supply is very good, and, while we do have some periods of unsatisfactory water which result in some increased chemical costs and increased technical supervision techniques, we have never complained too much about these problems.

We are anxious, of course, to keep pollution in the lake to a minimum, but we have been willing to undertake some increased treatment costs realizing that Lake Michigan water is so very much better than many other utilities in other parts of the country have to deal with. We are also cognizant of the fact that we are located in an industrial area, we serve large industries with at least part of their water supply, and we are anxious to have other industries locate in our area to promote the growth of the area and our water system.

On page 19, in the last paragraph, the report includes - "The lakeward reaches of Indiana Harbor are rust-colored from waste pickle liquor." Iron wastes in the raw water at our Jefferson Park station do constitute our major complaint on lake water pollution. At fairly regular intervals, our raw water is highly colored and does contain measurable amounts of iron.

During the last three years the average iron content in the raw water has been approximately 0.2 parts per million to 0.3 parts per million. Of course, as I have stated, we do not have iron in the water at all times, so these average figures do indicate that when we do have iron the quantities are much higher.

In 1963, we had a maximum concentration of iron in our raw water of 2.9 parts per million. This iron is generally in the ferric or insoluble form, which has been oxidized and is high colored. We have flown over the lake during periods of iron in the raw water, and we can definitely see the red colored water flowing toward our intake from Indiana Harbor.

It was our impression that this iron may have originated from the iron ore storage bins along the Harbor but, of course, we can't be sure of that. Actually, aside from the appearance of the raw water, the iron doesn't cause us too much difficulty in treatment. It does increase our chlorine demand slightly but not sufficiently to cause us any overall increases in our costs.

We are, of course, worried from the standpoint that there may be other things in the water that would be more harmful than the iron when this pollution does approach our intake. As I stated, generally the lake currents do not flow from Indiana Harbor toward our intake, and I would assume that the only time this condition occurs is when the wind direction changes and the currents then change from west to east toward our intake.

On page 40, the second paragraph again mentions Gary-Hobart Water Corporation. The report indicates " The Gary-Hobart Water Plant reports that, when high carbon dosages are required, hydrocarbon odors are always responsible." This statement is a little too positive because, while this is generally true, we do not always have hydrocarbon odors when there are high carbon dosages.

Most of this paragraph accurately states, however, that we do have most of our problems in the winter months. We think that most of these problems are caused by ice cover on the lake during this period of the year. Our carbon dosages at our plant are not nearly as high as other water plants with usual winter carbon dosages consisting of from 80 pounds to a maximum of 150 pounds per million gallons of water.

We have made phenol analyses on occasions and these have indicated the phenol content in our raw water during winter months running as high as 0.048 parts per million.

Although our water treatment problems in 1964 were not generally as severe as they were in 1963, we have noted an upward trend in our costs of treating water. Our total chemical costs for the period 1958 through 1964 have run as follows:: (These figures are in dollars per million gallons of water treated). Delivered costs of chemicals, with the exception of a five percent increase in aluminum sulphate in 1962, remained the same in this period.

1958	$6.52
1959	7.51
1960	6.50
1961	6.80
1962	7.13
1963	7.32
1964	7.62

The trend of upward costs is not necessarily indicative of taste and odor producing wastes, however. The cost of treating the water with activated carbon for taste and odor removal was actually the lowest in 1964 since 1958. Our carbon cost in 1964 was $1.50 per million gallons compared with $1.42 in 1958 and $2.36 in 1959. The cost of chlorine has not changed materially. In 1964, the chlorine cost was $124 per million gallons compared to $0.94 in 1958 and $1.23 in 1960.

The cost of aluminum sulphate in 1964 was $3.08 compared to $2.40 in 1960 and $2.93 in 1959. All of these costs are again in dollars per million gallons of water treated.

On page 43 of the report, the Gary-Hobart Water Corporation is again quoted in the last paragraph. The report indicates that we are reporting odors suggesting gasoline. Our laboratory thinks we have been misquoted here because we usually describe these odors as hydrocarbons.

It is true we do experience fairly high ammonia concentration. In 1963, ammonia nitrogen averaged 0.17 parts per million and in 1964 averaged 0.13 parts per million. The maximum ammonia nitrogen noted in our raw water was 2.43 parts per million. For some reason, however, the ammonia has decreased to almost none present during the last few months.

Page 44 again quotes us on iron concentrations, and I have already mentioned this. However, we did not indicate that: "This iron probably comes from waste pickle liquor discharged to Indiana Harbor."

We have collected intermittent samples, particularly in 1963, of water near the end of our intake at the Ogden Dunes plant, and the water collected is not too different than the quality of the Jefferson Park intake. We do note that the iron content is much lower while the ammonia nitrogen content is as high if not higher. This may indicate that the relatively high ammonia content in our raw water at the Jefferson Park plant is actually coming from sewage in Burns Ditch if the prevailing westward lake currents flow from Burns Ditch toward Gary.

CHAIRMAN STEIN: We have the statement of the Georgia-Pacific Corporation:

(Statement)

On January 1, 1965 Georgia-Pacific Corporation purchased the paper mill at Gary, Indiana, formerly owned and operated by Stiner Tissue Mills. This is such a short time ago that it hasn't had time to develop a program of pollution abatement.

For this reason it has no specific statement of plans for future work to present at this time. The Corporation is in agreement with the aims of the conference and can be depended on for its complete cooperation.

Yours very truly,

Signed, Paul Solheim, Resident Manager.

CHAIRMAN STEIN: We have the statement from the Town of Griffith, Lake County, Indiana:

(Statement)

Attached is a chronological resume of the Town of Griffith, Indiana, activities and construction relative to the abatement of stream pollution in Turkey Creek, Cady Marsh Ditch and tributary streams.

All residential, commercial and industrial construction within the Town of Griffith is required to tie into the sanitary sewer system.

During 1964 and currently, the Town of Griffith has planned and installed internal sewer facilities in addition to the original proposals. These facilities are being installed and extended by the Town in such a manner and location that makes it mandatory for all new construction to tie in.

Signed, Chester J. Ziemniak, Town Engineer

Glen Rayome, Sewer Commissioner.

TOWN OF GRIFFITH, INDIANA - SEWER PROJECT

STREAM POLLUTION ABATEMENT ACTIVITIES

July 30, 1959. Town of Griffith received from the Indiana Stream Pollution Control Board a Cease and Desist Order from causing and contributing to the pollution of Cady Marsh Ditch, Turkey Creek and tributaries.

November 21, 1959. Town of Griffith enters into agreement with Consoer, Townsend & Associates, Chicago, Illinois, as Consulting Engineers to prepare plans and specifications for the construction of a system of sanitary intercepting sewers to convey sanitary sewage from the Town of Griffith to the City of Hammond, Indiana - sewage treatment facilities.

June 11, 1960. Upon recommendation of its consulting engineers, the Town of Griffith formally petitions the city of Hammond to enter into a sewage treatment contract with the Town of Griffith whereby the Sanitary District of

Hammond will accept and treat the sanitary sewage conveyed to it for treatment by the Town of Griffith.

June 16, 1960. Town of Griffith enters into agreement with the Board of Sanitary Commissioners of the Hammond Sanitary District for the treatment of Town of Griffith's sewage.

September 1961: Town of Griffith received Indiana Stream Pollution Control Board approval and Department of Health, Education, and Welfare tentative approval of the Town of Griffith's plans and specifications for sewage facilities.

September 5, 1961. Town of Griffith advertises for construction bids in connection with the above sanitary sewage facilities project.

December 5, 1961. Town of Griffith receives bid proposals for construction of intercepting sewers, force mains, and pumping station.

January 16, 1962. Town of Griffith awards contracts to successful bidders on the above sewage facilities.

March 1963. Pumping station begins delivery of Town of Griffith sewage to Hammond on a test basis.

May 20, 1963. Pumping and delivery of sewage to Hammond begun in accordance with contract agreement.

August 1963. All construction work covering approved plans and specifications is basically completed.

CHAIRMAN STEIN: We have the statement from the Town of Portage Town Trustees.

STATEMENT PRESENTED AT THE MARCH 2, 1965 CONFERENCE ON WATER POLLUTION PRESENTED BY ALBERT W. YOVANOVICH

VICE PRESIDENT, PORTAGE TOWN BOARD

Gentlemen:

The Town of Portage, Indiana is located in the northwest corner of Porter County, and encompasses an area of roughly twenty-two square miles.

Portage is drained by Willow creek in the western areas, and empties into Burns Ditch just inside the western boundary, and by Salt Creek in the eastern areas and this empties into Burns Ditch approximately one and one-half miles from the discharge of the ditch into Lake Michigan. Salt Creek is joined by the Calumet River just inside the eastern boundary.

Portage is a new town, being incorporated in July 1959, and is still largely a residential area except for the industrial growth along the lake. Our growth has been rapid in the past five and one-half years. Our population in the 1960 Federal Census was 11,822, and late in a special census found 13,654 persons living in Portage. It is now estimated that our population is in excess of 17,000 people.

Being such a new town, we have not had time to construct many public facilities, but have started planning for them. A Master Plan was adopted in 1960 to insure that the building boom then in progress did not progress in a manner to endanger the health and safety of the existing and future inhabitants of Portage.

In 1961 an engineering firm was hired to survey the town for three major facilities, water supply, storm drainage and sanitary sewers and disposal plant.

Since that time a water supply system has been installed by the Portage Water Company, a subsidiary of the Gary-Hobart Water Company.

Storm drainage has been started, plans have been prepared by our consultant and have been approved by the Indiana Flood Control and Water Resources Commission.

We are presently interviewing consulting engineering firms with the intention of hiring one to design and supervise the installation of a sanitary sewer system and a sewage disposal plant.

At the present time there are three small private disposal systems in operation in Portage, two of them being in subdivisions, and the third serving the Portage Township Junior HIgh School and Senior HIgh School located near the center of town. All three units were approved by the State Board of Health before installation.

Last September the Indiana State Board of

Health ordered these units to provide chlorination of all effluent. Two of these units are already chlorinating effluent and the third will be by July 1, 1965. These units have been operated in an excellent manner, but cannot be considered permanent solutions to the problem. The Town Board has already enacted an ordinance providing that all private systems will connect their sewers to the public system when it is installed.

In addition to providing for connection of sewers, the ordinance referred to above provides for inspection of installation of individual disposal systems. In the past it was the duty of the County Sanitarian to inspect such installations, but because of the building throughout the county,he could not give the service needed. It was at his suggestion that the inspections were taken over by the Portage Building Department after enactment of the ordinance.

Just this past week a survey was completed of the watersheds in Portage with regard to stream pollution. As you know, this is not the best time of the year to determine degrees of pollution because of the cold, nor is one survey sufficient to be specific as to causes of pollution, but a general idea can be gained from even one survey taken at this time.

In general this survey shows that Portage does contribute slightly to the problem, but much of this can probably be attributed to agricultural sources and to the bog lands through which our streams flow. Perhaps later surveys can pinpoint sources of pollution which can be dealt with individually until our sewage system can be installed. This survey also shows that much more pollution enters the town from outlying areas, some of which are rural, and some urban in character.

In conclusion, I wish I could say we have sewers and a disposal plant being installed, but I can say we hope to be started on such a system in the very near future.

CHAIRMAN STEIN: We have a statement from the Simmons Company of Munster, Indiana.

PRESENTATION FOR CONFERENCE ON POLLUTION OF THE INTERSTATE WATERS EFFECTING VARIOUS RIVERS, ETC., AS OUTLINED BY THE SECRETARY OF HEALTH, EDUCATION, AND WELFARE TO THE STREAM POLLUTION CONTROL BOARD FOR THE STATE OF INDIANA, DATED DECEMBER 15, 1964.

Mr. Chairman and members of this conference:

My name is James R. Hooper. I am Central Division Chief Engineer for Simmons Company with headquarters at our Munster, Indiana Plant, located at 9200 Calumet Avenue.

Our Munster Plant began manufacturing in March of 1958. We employ at the present time approximately 1,600 people; our principal products at Munster are mattresses, upholstered dual-purpose furniture, and metal furniture.

Sanitary wastes are handled by the Hammond Sanitary District.

The wastes from our Plating operations are combined with our storm sewer facilities and are pumped approximately one mile to the Little Calumet River (West). These wastes are inorganic in nature.

On April 30, 1959, plans for a Waste Treatment Plant were submitted to the State of Indiana. After exchanging modified plans several times, the State of Indiana gave us an approval "go ahead" on September 30, 1959.

In April 1961 we found it necessary to do our own chrome plating, and on April 14, 1961, we applied to the State of Indiana for such permission. Approval from the Stream Pollution Control Board of the State of Indiana was made on July 18, 1961.

Operation and Control of Facility

All work and/or consulting was performed by the Industrial Filter & Pump Manufacturing Company of Cicero, Illinois, on all phases of our installation of our Waste Treatment Plant.

pH Control is maintained by the use of the Foxboro Controllers which insure optimum pH in the effluent.

The system for destroying cyanides to gaseous end products is as follows:

1. Cyanide rinses enter the first reaction basin, where a mixer insures a homogeneous mixture with lime and sodium hypochlorite.

a - Sodium Hypochlorite - 15 percent.

b - Calcium Hydroxide, approximately 1 lb. per gallon.

c - Retention time in the basin approximately 48 minutes.

d - pH range 9.5 to 10.

The line is fed by means of the Foxboro Controller which is actuated by electrodes in the basin. The flow is through an automotic valve over the basin which is controlled again by the Foxboro instrument. The Sodium Hypochlorite is fed by means of an ORP Controller Recorder which is actuated by electrodes in the basin. The flow is through an automatic valve over the basin which is controlled by the ORP Controller.

2. After the specified retention time the mixture, now with the cyanides oxidized to the cyanate form, overflows a weir and underflows a baffle into the second reaction basin. This method is used to insure against short cycling across the top of the basin. In the second basin a mixer allows for a homogeneous mixture of the chemicals:

a - Sodium Hypochlorite 15 percent

b - Sulphuric Acid 10 percent

c - pH range 7.5 to 8

d - Retention time approximately 42 minutes.

e - Provision for lime fed manually.

The acid is fed into the second reaction basin by means of the Foxboro pH Controller, which is actuated by electrodes in the basin. The flow is through an automatic valve over the basin which is controlled by the Foxboro.

The Sodium Hypochlorite is fed by means of a Foxboro ORP Controller Recorder, which is actuated by electrodes in the basin. The flow is through an automatic valve over the basin, which is again controlled by the heretofore mentioned instrument.

Lime may be fed through a manually operated valve into this basin in the event that the pH should drop below the optimum levels.

After the specified retention time, the waste overflows a weir and underflows a baffle into the final neutralization to undergo hydration and pH adjustment.

The reaction basins are equipped with covers and adequate ventilation.

The procedures outlined herewith indicate the methods employed at our Munster Waste Treatment Plant, and the State of Indiana carefully checks our procedure and the resulting effluent carefully and often.

Charts are maintained on a time basis, pH basis, quantities of chemicals consumed, O.R.P. final neutralization, and chlorine residual and are dated to conform to state requirements.

In 1964 we used 6,875 gallons of Sodium Hypochlorite, 1,155 gallons of Sulphuric Acid, and 26,000 lbs. of lime.

We have, on a full time basis, one man for each shift who continually checks the Foxboro automatic controllers and makes continuous checks of our Chrome Reduction and makes reports via charts and schedules of the Waste Treatment operation.

The effluent as it leaves our Waste Treatment Plant is clear and practically odorless.

All plans, specifications, and procedures were submitted to the State of Indiana and approved prior to any operation at our plant.

The last inspection by the Indiana Stream Pollution Control Board was made in January 1965.

We are planning, in the near future, on setting up a standard procedure, with a most reliable and fully equipped laboratory, for a program of sampling our effluents for a complete analysis. This will be done on a monthly basis and in accordance with effective procedures followed in such an evaluation of our type effluent.

A waste water flow meter will be installed.

Our charts maintained for the Stream Pollution Control Board will be expanded to include our planned future controls as I have just mentioned.

Simmons Company is most happy to be committed to a program of rigid controls for pollution abatement in the Calumet area. We join with all other industry in this area in thanking the State of Indiana for the fine cooperation we have received from its Stream Pollution Control Board, which has helped in making our beautiful plant truly a modern institution.

CHAIRMAN STEIN: We have a report from the La Salle Steel Company, Hammond, Indiana, submitted by W. A. Thiel, Chief Engineer:

(Statement)

As reported in Table VI-4A of the United States Department of Health, Education, and Welfare report on the pollution of the waters of the Grand Calumet River, Little Calumet River, Calumet River, Lake Michigan, Wolf Lake, and their tributaries, La Salle Steel Company disposes of some pickle liquor, which is neutralized by the addition of lime, by discharging it into the Grand Calumet River.

The amount disposed of is relatively small, about 18,000 gallons a week. This is neutralized by the addition of lime to achieve a neutral pH reading. This is accomplished by simultaneously emptying the pickle tube and the lime tube, both draining into a large settling basin having a capacity of 19,700 gallons. Here the neutralization is fully accomplished; the solids, lime, iron oxides and other solids settle out. The liquid is then pumped into a drain that empties into the Grand Calumet River.

In 1961 an abrasive cleaning machine was installed and in 1963 another similar machine was installed to replace 80 percent of our pickling operations. These machines clean the steel by using steel grit. It is our intention to use abrasive cleaning for all of our cleaning operations and eliminate pickling entirely. We hope to accomplish this in the near future.

In the meantime, it is our intention to continue to neutralize all of the spent pickle liquor which is discharged into the Grand Calumet River, checking the pH reading before discharge, thereby making sure no acid liquor is discharged into the river. The solids are removed by means of a bucket and disposed of by a commercial carrier.

All sanitary sewage is connected to the Hammond sanitary sewer system.

CHAIRMAN STEIN: We have a statement of the Northern Indiana Public Service Company, submitted by Rollin M. Schaefer, Vice President and Joseph A. Pelletier, Manager, General Engineering Department.

STATEMENT ON THE
SEWAGE AND INDUSTRIAL WASTE FACILITIES
OF THE
NORTHERN INDIANA PUBLIC SERVICE COMPANY
MARCH 1965

The Northern Indiana Public Service Company has three plants located within the area included in the February 1965, Report on Pollution of the Waters of the Grand Calumet River, Little Calumet River, Calumet River, Lake Michigan, Wolf Lake and their tributaries; namely, the By-Product Gas Plant located on Indianapolis Boulevard and Riley Road adjacent to the Indiana Harbor Ship Canal, the D. H. Mitchell Electric Generating Station on Lake Michigan immediately east of Buffington Harbor, and the Bailly Electric Generating Station, on Lake Michigan, in Westchester Township, Porter County, Indiana.

This report covers the work that has been done to prevent water pollution with details concerning the sewage and industrial waste disposal facilities installed at each of the above stated plants.

By-Product Gas Plant

This plant, constructed in the early Twenties, operated originally as a purification plant for coke-oven gases. It presently operates as a natural and propane gas storage plant where propane and air are mixed with natural gas for peak shaving operations.

All sanitary sewage at this plant goes into the sanitary sewer located on the north side of Riley Road. Other plant waste consists of storm water, roof drains and gas holder water overflow. These empty into a 30" storm sewer located on the east side of Indianapolis Boulevard. The water-sealed gas holder overflow is approximately 3,000 gallons per year (varies with rainfall). Propane storage tanks are located within concrete retaining dikes to prevent runoff in the event of tank leakage.

Dean H. Mitchell Electric Generating Station

On June 1, 1955, Approval No. 3114 was received from the State of Indiana Stream Pollution and Control Board for sewage and industrial waste disposal facilities proposed for Dean H. Mitchell Generating Station, which was under construction.

Sanitary System

The sanitary waste at this plant is discharged into septic systems set up for the main buildings and construction buildings. These facilities cost approximately $34,900.00.

Oil Drainage

Turbine oil storage has been provided with an oil drainage bed 20' x 32'-6"x7' deep and is filled with coarse gravel. Oil-filled transformers located on the property are surrounded by coarse gravel filter beds 55'x55'x1' deep.

Each pair of transformers has a filter bed of the stated size which is adequate to absorb all of the oil in the transformer in case of accidental rupture.

Circulating Water

Circulating water used by the plant to absorb waste heat is circulated through the condensers and returned to the lake. The quantity of water circulated by the plant is 149,000 g.p.m. when the lake-water temperature is coldest and 318,000 g.p.m. when the lake-water temperature is warmest. The water temperature is raised approximately 23°F. with the 159,000 g.p.m. flow. To control algae growth in the condenser, chlorine is the only chemical injected into the circulating water. The following quantities are used:

Winter - 1.736 pounds per minute for five minutes twice a day.

Summer - 1.736 pounds per minute for five minutes three times a day.

Ash System

The ash produced by burning coal in the boiler is conveyed to ash storage area settling ponds. Approximately 370 tons of ash per day are conveyed to the ash storage area. Ash is hauled from the property by truck.

Bailly Electric Generating Station

On August 23, 1961, Approval Number I.W. 66 was received from the State of Indiana Stream Pollution and Control Board of the sanitary sewer and industrial waste disposal plans for the Bailly Generating Station, which was under construction.

Sanitary System

The sanitary waste is discharged into septic systems set up for the main buildings and construction buildings. These facilities cost approximately $13,500.

Oil Drainage

Large oil--filled transformers located south of the main building are placed on concrete foundations surrounded by a filter bed 95' x 31' x 1'6" deep filled with coarse gravel. The capacity of the bed is more than the volume of oil that could be discharged in case of rupture of the transformers. An oil-drain bed is provided near the gas, oil, and hydrogen building to absorb the oil from the turbine-oil tank if it should ever become necessary to dump the oil.

Circulating Water

Circulating water used by the plant to absorb waste heat is circulated through the condenser and returned to the lake. The quantity of water circulated by the plant is 70,500 g.p.m. when the lake--water temperature is coldest and 141,000 g.p.m. when the lake-water temperature is warmest. The water temperature is raised approximately 16°F. with 70,500 g.p.m. flow. To control algae growth in the condenser chlorine is the only chemical injected into the circulating water. The following quantities are used:

Winter - 1.38 pounds per minute for a five minute period three times a day.

Summer --1.4 pounds per minute for nine minutes three times a day.

Ash System

Approximately 175 tons of ash per day from firing the main steam generator is conveyed by water to an ash storage area south of the plant. Ash is hauled from the property by truck.

Summary

Our By-Product Gas Plant, as a storage and mixing plant, is a closed system with no exposed raw materials, treating or extraction facilities and is generally free of industrial waste materials.

The electric generating stations circulate large volumes of water to absorb waste heat from the steam condensers. Daily chlorination of the water and removal of debris with screen filters improves the condition of the circulating water returned to the lake. Both of these plants are relatively new and the sanitary systems and waste disposal facilities were installed to prevent possible water pollution.

CHAIRMAN STEIN: We have a statement from the Town of

Highland, submitted March 3, 1965, by David A. Morrow, President, Board of Trustees, Highland, Indiana:

(Statement)

It is with a great deal of pleasure and appreciation that we, of Highland, Indiana, have been asked to appear before this committee for abating stream pollution in the Calumet area. The United States Department of Health, Education, and Welfare and this committee are to be commended. Their vital interest and concern for the well-being of the people of this area and the future of America is evident.

This being the date set for a hearing relative to pollution of the waters of the Grand Calumet River, the Little Calumet River, Lake Michigan, Wolf Lake and their tributaries in Illinois and Indiana, and that the Town of Highland, Indiana, has been mentioned as a contributing factor, we, therefore, wish to present facts pointing out that we are correcting this problem as finances are available.

In retrospect, Highland has been working toward the ultimate goal of no pollution since May of 1958. On this date the City of Hammond entered into its first contract with the Town of Highland to treat and dispose of a part of the sanitary sewage. Subsequently, Highland has been installing sewers and lift stations to deliver sewage to our Fifth Avenue pumping station from which we pump into

Hammond's system.

By June of 1966 Highland will have spent, since 1958, approximately $1.5 million on sewers, lift stations, and appurtenances necessary to deliver our sewage to the City of Hammond.

This seemingly insurmountable problem of disposing of Highland's sewage could not have been accomplished had it not been for the foresight, knowledge and courage of the City of Hammond, their Mayor Dowling; City Engineer, A. G. Gianinni; City Controller, Mike Kampo; The Hammond City Sanitary Board and the Hammond City Council, chaired by Mr. George Carlson. These men, contrary to some public opinion and ridicule, in 1964, ratified a new contract with the Town of Highland.

We would be remiss in our presentation today if we did not mention that the Town of Highland, with a population of 20,000, has sacrificed many and varied other services, conveniences, and necessities, in order to cease and desist the pollution of these waterways, by expending their tax dollars toward this goal.

The Town of Highland by the end of 1966 will no longer be polluting these streams except during excessive rain fall. This cannot be eliminated until the combination type sewer is made obsolete. We can only realize this end result as finances are available, which means that Federal grants are going to be necessary to expedite or speed up this solution.

The City of Hammond is willing to help and serve their smaller neighboring towns, but continue to have their own problems and need assistance also.

In conclusion, it is obvious the major stumbling block for the complete elimination of this problem is financing. It follows then that if this job is to be accomplished by the individual cities and towns, we will be another half century debating in committee the pros and cons before the ultimate goal is realized.

We, therefore, wish to point out that the need for complete cooperation and coordination is more prevalent now than ever before between Federal, state and local governments.

CHAIRMAN STEIN: We have a report from the City of Crown Point, Indiana:

(Statement)

The City of Crown Point in Lake County, Indiana, is about to construct two new large interceptor sewers. These new interceptor sewers will make is possible for the City to install local sewers in parts of the City not previously served, to relieve existing sanitary sewers and separate certain combined storm and sanitary sewers, and to serve new areas being annexed to the City.

The City of Crown Point is also in the process of expanding and improving its sewage treatment plant to handle the increased sewage flow from the new interceptor sewers. It is believed that no untreated sewage will leave the City of Crown Point after the completion of the new interceptors and the expansion of the treatment plant.

Respectfully submitted,

Signed, William F. Carroll, City Attorney.

CHAIRMAN STEIN: Now, you can be sure that all these statements will be read carefully and listed by the conferees and this will be part of the record. Just because they are not read, in the interest of time, we nevertheless will give it full credence, and we will take these into account.

As an example, to show you the type of importance of these, we have the statement of Charles Sandor, Department of Water Works, City of Hammond, Indiana, and I would like to read a few sentences from his statement, which will indicate the type of material.

"The raw water in 1964 was by far the poorest quality ever recorded by the Hammond Filtration Plant.

"The average raw water is rapidly becoming poorer in quality.

"The instances of poorest quality raw water is occurring more frequently and for greater hours in duration.

"The pollution which strains the Hammond Water Filtration Plant the most are the phenols and oily wastes, sewage and plankton.

"At times the industrial pollution is so great that all the activated carbon slurry that pumps can feed into the raw water is not ample.

"To sum it up, the quality of raw water at the Hammond's Water source was excellent between the years 1891 and 1925, satisfactory between the years 1926 and 1945, poor between the years 1946 and 1955, and very poor quality between the years 1956 to 1965. The quality level of the period 1926 to 1945 should be restored and maintained.

"The effect of the degradation of the present water quality is that it is becoming very difficult to produce a safe and satisfactory water, using the present conventional equipment and chemicals and employing the present conventional water treatment methods."

We have one other statement by the Mayor of the City of Whiting, Mayor Joseph B. Grenchik:

(Statement)

Mr. Chairman, conferees, ladies and gentlemen:

I am Joseph B. Grenchik, Mayor of the City of Whiting, Indiana. This statement is for and on behalf of the people of Whiting.

The City of Whiting is interested in abating water pollution in Lake Michigan for several reasons. First, we have a moral obligation to all the people who also benefit by their proximity to Lake Michigan. Secondly, our raw water supply for our Water Filtration Plant is drawn from the Lake along our shoreline. Thirdly, we have, over a great number of years, maintained a beach on Lake Michigan which attracts hundreds of bathers daily during the hot summer months. The City of Whiting intends to keep this beach open in the future if the Lake County Board of Health permits.

In 1945 the City of Whiting entered into an agreement with the Board of Hammond, Indiana, Sanitary District, for the treatment of its sanitary sewage. This agreement is today in full force and effect. Over the past five years the City has paid approximately $8.00 per year for each man, woman and child residing in Whiting for the treatment of its sanitary sewage, and the agreement calls for higher costs in the future.

It is true that during torrential rainstorms it becomes necessary to by-pass the sewage plant of the Hammond Sanitary District. Not having a dual sewer system makes this necessary. As soon as the sewer level recedes, the by-pass to the Lake is closed. Since taking office on January 1, 1964, one of my main concerns is to be certain that the by-pass is closed except during a heavy rain.

In December of 1964, the present City Administration negotiated a contract with the engineering firm of Consoer, Townsend and Associates for the purpose of conducting a complete survey of our entire sewer system. The cost to the City for this survey will be approximately $1.00 per each citizen.

Just last year the City celebrated its 75th Anniversary, and many of our sewers are at least that old. I cannot say that the City of Whiting will install a separate sewer system as a result of this survey, but I can say that the Administration will cooperate in the problem of water pollution abatement.

Thank you for giving the City of Whiting an opportunity to make this statement.

CHAIRMAN STEIN: Mr. Klassen?

Mr. Klassen: Mr. Chairman, could I add one more statement from the Hammond Water Works Superintendent?

CHAIRMAN STEIN: Certainly.

MR. KLASSEN: "Only when there is a strong north wind does the pollution diminish in the filtration plant's raw water supply. The fresh water from the north pushing in displaces and dilutes the polluted water."

CHAIRMAN STEIN: I can assume from your selecting that sentence that Illinois is in that direction?

(Laughter)

MR. POSTON: Mr. Chairman,

MR. KLASSEN: This is of particular interest, though, Mr. Chairman, inasmuch as the Mayor, I believe, of East Chicago, yesterday intended to show that the water in that area was of good quality and I think -- I don't know Mr. Sandor, don't know anything about him, but I think that, from reading this, he's certainly joining the ranks of dedicated people who are trying to do a job in providing safe water under extremely difficult conditions.

CHAIRMAN STEIN: I will give these to the reporter and would you enter these into the record, please.

MR. POOLE: I have an emergency phone call.

Would you introduce --

MR. POSTON: Mr. Chairman, I noticed that you read one of these many reports which you have entered in the record here.

Does that infer that all of the other reports are of the same significance as this one of Mr. Sandor?

CHAIRMAN STEIN: I just selected sentences from the record.

I made no evaluation as to significance. I hope the conferees will read them carefully.

Mr. Poole or Mr. Miller, will the Mayor of

Hammond -- is he going to appear so that we could ask him some questions about that?

MR. MILLER: Mr. Giannini has been designated.

MR. POOLE: By the Mayor of Hammond.

MR. KLASSEN: A representative of the City, we will get an opportunity to ask him some questions.

CHAIRMAN STEIN: Mr. Miller.

MR. MILLER: The next representative will be from the City of Hammond and will be Mr. A. G. Giannini, City Engineer, Sanitary District, Hammond, Indiana.

MR. GIANNINI: Mr. Chairman, conferees, ladies and gentlemen:

I have presented this brief as requested by our Mayor Dowling, in reply to the report prepared by the Health, Education, and Welfare Department in February of 1965.

In presenting this brief, if I may, Mr. Chairman, I should like to just skip over briefly the various chapters in the interest of saving time.

CHAIRMAN STEIN: Would you want the whole thing to appear?

MR. GIANNINI: I would like the whole thing to appear.

CHAIRMAN STEIN: Without objection, this will be done.

MR. GIANNINI: The Hammond Sanitary District, charged with the task of disposing of all sanitary waste materials from sources within the district, was organized on October

31, 1938, more than 50 years after Hammond became an incorporated city. In the years preceding its formation, the city fathers had become concerned about the city's drinking water supply and were searching for ways to solve the increasing lake pollution problem. Local sanitation also was becoming a problem.

During the growth of Hammond, the city, through its Board of Public Works and Safety, had built a network of sewers which handled both stormwater and sewage. All of the waste from the kitchen, laundry and bathroom, as well as surface water from streets and industrial wastes, were discharged into the Grand Calumet River, the Little Calumet River, and Lake Michigan. This situation was creating both a health hazard and a nuisance.

Of greatest concern to the city fathers, was the fact that dumping raw sewage into Lake Michigan increased the problem of supplying safe drinking water to the residents of the area, since Hammond and other Calumet Region cities all obtain their water from the lake. It was time, they felt, to provide a special treatment of domestic and industrial wastes before the situation became serious.

The Sanitary District was thus formed through authority of the Indiana Acts of 1917, which contained rules, regulations and procedural instructions for its establishment. The District today is still governed by these acts and subsequent amendments. A Board of Sanitary Commissioners was set up to run the District and carry out the aims of the administration. Members of the Board include the city engineer, by virtue of his office, and two other men appointed by the mayor. The Board meets every first and third Thursday in the Administration Building and all such meetings are open to the public.

Under the law, the district also had bonding power apart from that of the city. It was this that enabled the District to raise funds through the sale of bonds so that it could build facilities to handle the sanitation problem. At its inception, the District had bonding power limited to two percent of the assessed valuation within the boundaries of the city of Hammond. (Today, the District's bonding power has risen to a limit of eight percent of the assessed valuation of the cities of Hammond and Munster combined, which came into the District in 1948, or more than $15 million, compared with about $3.5 million in 1938).

Once the District was created, the commissioners got down to the business of building facilities. But before they could do this, they had to raise the money to be able to pay for them. Fortunately for the District, the Federal Government at this time was providing funds for cities to improve their public works facilities.

The Government, through the Public Works Administration, would pay 45 percent of the cost of building a treatment plant, pumping stations and necessary interceptor sewers. However, the Government could not enter into the cost of the site. The total cost, including the site, to get the sanitary district in operation, came to about $7 million. But of the total, the District only paid about $3,250,000 as its share of the cost. This included purchase of the site.

Once the plans for the District facilities were complete the Commissioners had to look around for a treatment plant site. There were two requirements that had to be met in finding a suitable location. First, the site had to be near a receiving stream, so that the treated flow could be removed and, secondly, the area had to be large enough to handle the wide-spread facilities needed for the operation of a sewage treatment plant and also for its future expansion.

The Commissioners began searching the city for a location that not only would meet these requirements but one that also could be bought cheaply. Several sites were found that would suit the purpose of the Sanitary District and it was finally agreed that a 58-acre tract along the Columbia Avenue and the Grand Calumet River was best suited for the purpose.

The land was cheap because it was river bottom land and of little value for industrial or commercial usage. It also was picked because the city already owned about one-quarter of it which could be turned over to the Sanitary District.

And, finally, a pumping station had been built by the Board of Works on Columbia Avenue to handle the flow to the river which could be converted for use by the Sanitary District. The only thing necessary to make the property usable was to fill it in and thus raise it several feet above the level of the river.

Once the necessary papers were signed to give the District ownership of the 58-acre tract, ground breaking ceremonies followed. Construction of the plant facilities was begun in December of 1938, just two months after the District was created. At the same time, the District took inventory of what equipment and facilities already in use could be converted for sanitation purposes.

The engineers found that much of the existing sewer system could be used to transport sewage to the treatment plant, with modifications and improvements. It also was determined that the pumping station on District property, at Columbia Avenue, could be renovated and enlarged to direct the sewage to the plant.

At the same time, it was determined that three pumping stations would have to be built to accommodate the operation. These were located at Kennedy Avenue and Michigan Street, the South Side station at 77th Street and Columbia Avenue and the Robertsdale station at 115th Street and Atchison Avenue.

Construction of the treatment plant itself included a network of tanks, such as primary, aeration, final clarification and sludge digestion, through which the sewage would pass and be treated; buildings to house mechanical equipment needed to operate the tanks, and an administration building from which to direct the operation of the plant.

The administration building, located in the center of the District property, houses offices for the Board, superintendent, supervisory personnel and clerical help and a laboratory where the tests are made of the various processes the sewage passes through while it is treated. Finally, 20 miles of intercepting sewers were added to the city's sewer system to facilitate the movement of waste to the plant.

The work that started in late 1938 to give the City of Hammond a sewage treatment works took four years to complete. The multi-million dollar plant was placed in complete operation in September of 1942.

Since that time, all the sanitary sewage originating within the District, as well as all industrial wastes discharged to the sewer system, has received complete treatment in the Columbia Avenue plant.

Designer of the treatment works was Charles H. Hurd. Most of the District improvements during the past few years have been designed by Consoer Townsend and Associates, the city's consulting engineers.

Four years after completion of the treatment plant, the first improvement in the city's sanitary sewer system was made. Sewage was being dumped into the existing sewer system and during heavy rains, the sewers couldn't handle the increase and caused the sewers to back up and flood basements.

It was decided that an extension of the south side interceptor sewer be made from 165th Street and Columbia Avenue to Michigan Street and Columbia Avenue. This extension paralleled the existing city sewer and removed the load from it in heavy rains.

In 1948, the town of Munster was brought into the District, through mutual agreement of the administrations of the two municipalities. Munster residents were taxed equal to those in Hammond and they were to receive the same benefits. This arrangement also increased the bonding power of the District because it would then include the assessed valuation of Munster.

The addition was made during the early part of the year and work began immediately to tie in the Munster sewer system so that the sewage could be treated at the Hammond plant. The District, by this arrangement, was responsible for building a pumping station to service Munster and also to build an interceptor sewer to establish the connection.

When this work was completed, sewage in the far east and far west portions of Munster was relayed for treatment in the Hammond plant. At this time, most of the center of Munster was still farm land. The Munster work cost about $360,000 to complete.

One year later, in 1949, the Hammond Sanitary District took over the responsibility of operating all the stormwater pumping stations in the city from the Board of Works. This required renovation of stations along the Little Calumet River and the addition of two more pumping stations, one at Tapper and the river and the other at Van Buren and the river. With the two that had been built along the Little Calumet at Baring and Hohman Avenues, this brought to seven on the Hammond side of the river for which the Sanitary District was responsible. There were two more on the Munster side.

It wasn't until 1952 that expansion finally was needed at the sewage treatment plant. Because of the growth inside the District, the plant was reaching capacity and had to be made larger to handle projected increases. First three additional stormwater pumps were put in the Columbia Avenue pumping station. Then three sludge concentration tanks were added to aid sludge disposal at the plant. Also added were eight sludge disposal beds and an extension of the south side interceptor to Cline Avenue.

All of these additions in 1952 totaled $850,000 and was the first major work at the plant since its original construction.

Besides treating all of the sewage in Hammond and Munster, the Hammond Sanitary District also treats sewage from the towns of Whiting, Griffith and Highland. However, since they are not part of the District itself, they are charged by the amount of sewage treated on a contractural basis. The town of Griffith made preparations in 1963 to have the Hammond Sanitary District treat its sewage, similar to the other neighboring towns.

Treatment Plant and Its Operation

The physical properties of the sewage treatment plant cover about 20 acres of the 58-acre tract owned by the Sanitary District along Columbia Avenue and the Grand Calumet River. During the latter part of 1962 and early 1963, a multi-million dollar expansion program was carried out at the plant to increase its capabilities. This expansion saw several more acres of the property covered with new structures and equipment.

Various size tanks and sand drying beds are located at the Sanitary District site, besides a number of buildings from which the operation is run and controlled.

Located there are the Administration Building, Primary Treatment Building, Power Building, Gas Control Building, Sludge Control Building and the Maintenance and Equipment Storage Building. The buildings are constructed of yellow brick, are fireproof and are equipped with the most modern instruments, electrical and mechanical machinery needed to carry out the sewage treatment process.

There are 12 shift operators at the plant and 12 at the pumping stations scattered throughout the city. Relief operators are available for vacation purposes and emergencies. The operators are selected for their mechanical aptitude and are given whatever training is necessary to make good operators.

Other personnel of the District include two chemists for the laboratory, a part-time electrician, a truck driver used for hauling sludge, seven maintenance--men mechanics, painter and laborers, all used when necessary to maintain the buildings and repair equipment. Maintenance of the equipment is important because the plant is in operation 24 hours a day, seven days a week.

The treatment plant is of the so-called biological type, employing the activated sludge process along with separate sludge digestion. Essentially, the plant functioning is dependent upon the utilization of certain bacteria and other biological organisms normally contained in the sewage which reaches the plant for treatment.

The physical plant in operation provides and maintains environmental conditions favorable to the life requirements and growth of these biological individuals, which are put to work in accomplishing the sewage treatment process.

The sewage, or influent, comes into the plant system through the Columbia Avenue pumping station, after passing through the maze of sewers and pumping stations located throughout the city to collect and relay the waste material. The first stage of treatment is handled at the pumping station. All rough and coarse material is removed by screens and transported to a hammer mill grinder inside the station. Here, rags, sticks and other coarse debris are removed, ground and fed back into the sewage to be treated. This process prevents pipes through which the waste passes from clogging up and protects the expensive pumping equipment.

The sewage is first pumped into pre-aeration tanks (20 by 30 feet wide and 8 to 12 feet deep) where two functions are performed. One is the removal of grit, consisting of sand, cinders, etc., by separating it from the organic matter. The grit is thoroughly cleaned and makes excellent fill material, which has been used on the District property.

After it is cleaned, the grit is moved by conveyors to trucks and then to where it is needed. About 3 or 4 cubic feet of grit is processed each day.

The second function of the pre-aeratin tanks is to freshen the raw sewage by blowing air under pressure into it. The waste material then passes into primary sedimentation basins where more solids are separated from the liquid waste. This is all part of the primary treatment process. The sewage is then run through a secondary treatment process before it is discharged into the Grand Calumet River, a clear liquid.

During the treatment of the sewage, two by-products are acquired which become available for use at the plant. One is a methane gas which is produced in sufficient quantities to be used as fuel for two 425 h.p. gas engines. If this gas were bought, it would cost between $1,600 and $2,200 a month to keep the plant fully supplied.

The gas engines drive blowers producing air required in the aeration tanks. Heat recovered from both the water jacket and the exhaust gasses of the engines is used for maintaining temperatures within the sludge digestion tanks. Boiler facilities also are provided that use the by-product gas for heating the sludge digestion tanks and plant buildings.

During the digestion of the sewage solids, after the volatile matter (biological breakdown) has been reduced to a practical limit, the character of the residual material is entirely changed. It becomes a thick viscous liquid, having a not unpleasant tarry odor, and is otherwise not readily identified as to its original source.

As a black, tarry liquid, the sludge is permitted to flow by gravity to the surface of sand-drying beds, where by percolation into the sand and by air drying, most of the moisture is removed. The material which remains on the bed is in the form of a cake, which resembles black soil in appearance.

The material, called humus sludge, is used to supply humus to soil and as a fertilizer. Farmers pick up the humus sludge at the plant free. The process for turning the heavy sewage into a usable product is a lengthy one taking from 20 to 40 days to complete.

The sewage treatment plant, prior to the expansion program, handled about 28 million gallons of raw sewage per day. However, when construction on new facilities is completed, the plant will handle up to 38 million gallons of raw sewage per day. Expansion was necessary to keep up with the ever growing District.

Construction

In 1959, while recognizing the need for maintaining a safe drinking water supply in Lake Michigan, the Sanitary District's Board embarked on a construction program to improve the environmental health problem of flooded basements caused by back-up of our combined sewers during storms. The city's rapid growth of the 1950's caused our existing sewer system to be inadequate. A substantial amount of relief sewer and pumping station construction became necessary for the prevention of combined sewer flooding.

The two-fold purpose of the Board was clearly demonstrated by the 1959 project in the Robertsdale section of Hammond. A stormwater relief sewer was installed in the western half of Robertsdale to handle only the run-off from streets.

The project included the erection of a pumping station in Forsyth Park discharging only stormwater into Wolf Lake. In the eastern half a stormwater relief trunk sewer was provided with additions to the existing pumping station at 115th and Atchison Avenue. These relief sewers are designed to permit the eventual complete separation of

Robertsdale sewers by installing branches and laterals to pick up street drains only.

As soon as money becomes available it is planned to complete the separation of Robertsdale's sewers by installing branches and laterals to pick up street drains only.

As soon as money becomes available it is planned to complete the separation of Robertsdale's sewers in such a manner that only stormwater will be discharged into Lake Michigan and Wolf Lake. The existing combined sewers will then become separated sanitary sewers flowing continuously to the District's Sewage Plant. Results since 1959 indicate that the environmental health problem was eliminated and a good start made on the longer range separation plan.

The population explosion of the 1950's caused treatment plant improvement with four new digestors in the 1959 construction program to handle a greater amount of organic material coming into the plant. To further improve the plant effluent discharged into the Grand Calumet River, the District in 1962 constructed at the plant six new primary tanks, two aeration basins, two final clarifiers and shallow lagoons for sludge disposal utilizing the existing flood plain of the Grand Calumet River. The District received a $250,000 Federal grant from the United States Department of Health, Education, and Welfare for its treatment plant work handled through a $3,100,000 bond issue.

Also, in 1962 a storm relief sewer was started in the Downtown area with a pumping station on Sohl Avenue discharging into the Grand Calumet River. This relief sewer is also designed to handle future branches and laterals picking up street drains in the area and thus eventually leading to a separate sewer system. When money is available to complete the separation, the Sohl Avenue station will discharge only stormwater into the Grand Calumet River.

The last project initiated in 1962 was the Hessville Munster project. In Hessville the project was similar to those in Robertsdale and the Downtown section. It provided storm relief sewers and a pumping station addition to the existing Kennedy Avenue pumping station.

Planned eventual separation will again have the Kennedy Avenue station pumping only stormwater into the Grand Calumet River. The Munster project provided new sanitary interceptor sewers to pick up dry weather flow South of the Little Calumet River and in the Schoon Ditch area.

The Little Calumet River was improved by cutting off the sewers discharging directly into the River and connecting them to the new interceptor carrying the sanitary wastes to the District's Treatment Plant. To further abate the pollution of the Little Calumet River, the Sanitary Board, in 1962, agreed to treat the sanitary wastes of Highland and Griffith. In the following year the first connections to our South Side interceptor were made by both towns. Contracts are in force for eventual treatment of all the dry weather sanitary flow from Highland and Griffith as soon as additional sewers can be constructed.

In 1961 the Sanitary Board hired the firm of Consoer-Townsend and Associated of Chicago to survey the entire District and advise the Board on what was needed to up-date the sewer system. The engineering report outlined a complete program for improvements to eliminate the continuing health hazard and property damage due to backflooding of basements.

In December of 1964, the Near North Side storm relief sewer was initiated with the sale of a bond issue for $2,640,000. Construction contracts have been executed and the work will begin in March of 1965. The North Side relief sewer is again planned for eventual separation of existing sewers with the Johnson Avenue pumping station on the north side of the Grand Calumet River some day discharging only stormwater into the river.

The Sanitary Board and the Board of Public

Works, on advice of the Indiana State Board of Health has insisted since 1957 that all new subdivisions have separated storm and sanitary sewers wherever possible. In 1964 the District contracted for a stormwater pumping station at Calumet and Sheffield Avenue to service the new storm sewer being constructed on Sheffield Avenue. The pumping station will discharge only stormwater into Wolf Lake. The Board of Public Works contracted in February of 1965 for the storm sewer to be started this spring. The District also contracted for the separate sanitary sewer on Sheffield Avenue since this is an industrial area having no sewers at all.

Bonding Power

The crux of water pollution control in the final analysis has been and always will be financial. The big problem of the Sanitary Board in the past was lack of funds to finance needed improvements. Enabling legislation passed by the State Legislature limited the bonding power of the District to a maximum two percent of assessed valuation of the property within the District. In 1955, this was raised to four percent, four years later to six percent and in 1961 to eight percent. A bill raising the bonding power to ten percent is in the present legislature and has passed the Senate. When passed by the House, the District will again proceed with planned improvements outlined in their engineer's report of 1961.

Table I - Bonds Outstanding gives a clear picture of the financial operations of the District down through the years. (See Page 1381)

Table II shows that the District has used its (See Page 1382) power to the limit in recent years. The present Board is determined to make every effort to improve conditions in Hammond as money becomes available. Approximately $670,000 will become available in 1965 as bonding power due to repayment of principal on outstanding bond issues. This will be put to use as soon as the final actions of the legislature are known.

Federal grants have been received by the District totalling approximately $475,000. More grants will be sought where projects qualify but it appears that the amount of the grants will have to be increased substantially if Hammond is to achieve ideal water pollution abatement in a short period of time.

This becomes evident when we consider that our planned program of sewer separation covers an area of approximately 10 square miles. Estimates of costs, by our engineers, are $8,600 per acre. Other engineers' estimates have been quoted being as high as $15,000 per acre.

Using our engineer's cost estimate, the District will need an additional $55,040,000 for separation

TABLE I

BONDS OUTSTANDING - 1965 - SANITARY DISTRICT

ISSUE	Date of Issue	Amount of Issue	Amount Paid	Outstanding 1-1-1965	Interest Paid 1965	Outstanding 12-31-1965
Series A	2-1-39	210,000.00	175,000.00	42,000.00	94,500.00	35,000.00
Series B	4-1-39	240,000.00	200,000.00	48,000.00	98,860.00	40,000.00
Series C	9-1-39	300,000.00	250,000.00	60,000.00	145,170.00	50,000.00
Series D	12-1-39	600,000.00	480,000.00	140,000.00	244,200.00	120,000.00
Series E	4-1-40	408,000.00	326,400.00	95,200.00	141,780.00	81,600.00
Series F	5-1-42	25,000.00	22,000.00	4,000.00	7,177.50	3,000.00
Series G	4-1-45	175,000.00	126,000.00	56,000.00	25,987.50	49,000.00
Series H	9-1-48	380,000.00	240,000.00	155,000.00	117,700.00	140,000.00
Series I	7-1-52	850,000.00	460,000.00	424,000.00	169,604.50	390,000.00
Series J	12-1-59	4,100,000.00	656,000.00	3,608,000.00	769,488.00	3,444,000.00
Series K	5-1-62	3,100,000.00	248,000.00	2,976,000.00	254,448.00	2,852,000.00
Series L	7-1-62	3,750,000.00	300,000.00	3,600,000.00	322,875.00	3,450,000.00
Series M	12-1-62	2,900,000.00	116,000.00	2,900,000.00	196,359.00	2,784,000.00
Series N	12-1-64	2,640,000.00	None	2,640,000.00	None	2,640,000.00
Total		19,678,000.00	3,599,400.00	16,748,200.00	2,588,149.50	16,078,600.00

TABLE II

BONDING POWER - 1965 - SANITARY DISTRICT

ASSESSED VALUATION OF HAMMOND..............	$	181,032,725.00
ASSESSED VALUATION OF MUNSTER..............	$	24,313,940.00
TOTAL ASSESSED VALUATION...................	$	205,346,665.00
SANITARY DISTRICT BONDING POWER..8%..or....	$	16,427,733.20
OUTSTANDING BONDS as of 12-31-65...........	$	16,078,600.00
UNUSED BONDING POWER as of 12-31-65........	$	349,133.20
BONDS RETIRED as of 12-31-65...............	$	669,600.00

January 1, 1965

of the existing combined sewers. Planned improvements require another $5,000,000 making a total expenditure of $60,000,000 before total water pollution abatement can become a reality in Hammond. (Approximately $6,000,000 are required for completing the sewer separation in the Robertsdale area along Lake Michigan).

The taxpayers of the District are willingly facing the bill for the planned improvements of the District. But it will be purely conjecture as to how far and how fast the taxpayers will approve increased bonding powers by action of the State Legislature.

Federal grants would be of great help. Interest costs of $2,588,159 on present bond issues are shown on Table I to be compared to bond retirement to-date of $3,599,400. Thus, Federal grants would speed up the work for pollution abatement and at the same time save the taxpayers the bond interest costs.

Recommendation for Corrective Action

The Hammond Sanitary District has fully cooperated with the Indiana State Board of Health and the Stream Pollution Control Board in the past and will continue to do so. We rely on their recommendations for improving the public waters of the area and have gone so far as to agree to disinfecting our treatment plant effluent as soon as we can.

Last year we agreed to install chlorination equipment to sterilize the effluent at an estimated cost of $400,000. However, after reading in Recommendation No. 5 for a dam built across the Grand Calumet River east of the outfall from the East Chicago Municipal Waste Treatment Plant, we are of the opinion the money for sterilization equipment would be wasted.

The dam would cause our plant effluent to flow west continuously in the Grand Calumet and eventually into the Illinois River where natural improvement is found at Peoria. It is our contention that if the City of Chicago does not have to chlorinate their much larger amount of plant effluent it should not be necessary for Hammond to do so since we have comparable treatment.

We agree that the effluent should be improved only if the suggested dam is placed west of our plant outfall. We realize that natural improvement of the effluent flowing into Lake Michigan through the Indiana Harbor Ship Canal cannot be accomplished. To improve the source of our drinking water supply -- Lake Michigan -- it would behoove Hammond to chlorinate its plant effluent. But not if natural improvement is found in a westerly flow. Until the dam location is settled we will hesitate and will want to further study the value of chlorination to Hammond.

Hammond has been complying with Recommendation

No. 6 since its treatment plant was constructed. We have secondary treatment and since 1948 have been treating the municipal wastes of the small town Munster, Indiana. The towns of Griffith and Highland are likewise under contract with Hammond for their municipal waste treatment. The towns, and Hammond have been moving toward integrated sewer systems as rapidly as money for necessary construction work became available.

In regard to Recommendation No. 7, the Sanitary District constructed sludge lagoons in the flood plain bordering its plant. Constructing lagoons for further treatment of waste effluents is of questionable value since the building of the Cal-Sag Channel in Hammond will displace the lagoons. It is our understanding that Stage II of the Cal-Sag improvement in our area is in the not too distant future, since Stage I in Illinois is almost completed.

Recommendation No. 8 has been discussed above with Recommendation No. 5.

In the final analysis, it is obvious that the Sanitary District has worked diligently through the years for the better water pollution control on all of its lakes and rivers. Major steps indicated herein have been taken toward a final solution of the pollution problem.

The one remaining hurdle is sufficient funds for a rapid solution. With the District retiring bonds at the present rate of $670,000 per year and its bonding power exhausted, it will require from 60 to 100 years to complete its water pollution abatement program. It is apparent that other new sources of money will have to be found to expedite the necessary construction in the cities and towns.

Hammond Park District

The City of Hammond Park Board, by ordinance #2123 (1929) sold to Lever Brothers the land that their building is now situated on.

On March 25, 1936 an agreement was drawn up between Lever Brothers and the Health Department of the City of Hammond regarding the composition of materials proposed to be emptied into Wolf Lake. From the above stated date to the present date, there has been contention between Hammond Park Board and Lever Brothers Company as to pollution of Wolf Lake and Wolf River. Our last letter to the Stream Pollution Control Board regarding pollution of Wolf River by Lever Brothers was dated June 14, 1961, requesting prompt consideration to action necessary to terminate pollution and contamination reported in Wolf Lake.

Between 1936 and 1965, the Hammond Park Department has lost the use of Wolf River as a swimming area and fishing area due to pollution.

From May 6, 1929, until March 22, 1946, the Hammond Park Department was in contention with the American

Maize Products Company (Amaizo) regarding their discharge into the Wolf River. On March 22, 1946, the Department was notified that the Amaizo plant no longer pumped any discharge into the Wolf River.

From the above mentioned statement, it was learned that Amaizo pumped their discharge into Lake Michigan. This discharge has been investigated by the State Streams Pollution Control Board. It was stated that pollution of the lake was composed of sugar and starch. Records of this pollution should be on file at the State Stream Pollution Control Board Office in Indianapolis.

In 1948 the Hammond Park Board found it necessary to close the Lake Michigan Beach to swimming upon the request of the Hammond Board of Health. This beach has never been reopened. Bacterial counts at Lake Michigan Beach vary from 4600/ to too many to count. Pollution is said to be the result of industrial wastes and raw sewage being discharged from the Whiting pumping station on Atchison Avenue.

John N. Higgins, Administrator.

MR. GIANNINI: The first chapter is introduction to the Hammond Sanitary District. We have a history here. The only thing I want to say about this history, in 1938 when the Sanitary District of Hammond was formed, the sentence here says, "Of greatest concern to the City fathers was the fact that dumping raw sewage into Lake Michigan increased the problem of supplying safe drinking water to the residents of the area, since Hammond and other Calumet region Cities all obtain their water from the lake."

I assure you that that is the same feeling that exists today and has existed throughout the City of Hammond's Sanitary District.

Skipping over to page 4, we have a summary of the treatment plants and its operation.

This is only put in here to answer any questions the conferees may have and if there are any further questions beyond what we explained here, we would be glad to answer them.

I am skipping over to chapter 2, page 6, which is the improvements.

I don't think I will read them off as they are here because Mr. Perry Miller has covered them pretty well in his statement.

I do want to point out though, that we have a twofold purpose of the Board in trying to complete these projects. Since 1957, eight, nine years -- eight years of the present administration - we have spent some 12 million dollars in putting in improvements to improve the pollution of the waters around Hammond.

One of the major projects that Perry Miller mentioned was the three million six hundred thousand dollar ($3,600,000) improvement to our treatment plant.

Then, we have three major sewer projects that have been completed, all of them with the express purpose of relieving, first of all, an environmental health situation that exists in Hammond due to the backing of the combined sewers in the basement, but while we were putting in these relief sewers to relieve this condition, we have always kept in mind to eliminate all pollution around Hammond, in its rivers, and its lakes and that it would one day be necessary to separate our sewers. So, all of the storm relief sewers we have put in would be with the idea that some day we would eventually be able to separate our sewers and have a separate system.

While doing this, as an example of separating, we have taken the west side of Robertsdale, which is up on the lake front, and separated that with a relief sewer and a pumping station that discharges nothing but stormwater into Wolf Lake channel.

We separated and relieved the sewers there and we think we did the job properly.

It is an example of the job we intend to do all over the whole city, whenever the money becomes available.

On the other side of Robertsdale, we put in the relief sewers and added to the relief pump at Robertsdale with the idea eventually of one day completing the separation there.

We have installed relief sewers in our downtown section of Hammond. They are all operating with a new pumping station, stormwater relief station, discharging from the new sewers which also will one day contribute to the eventual separation of our system. In Hessville, the same thing holds, with a pumping station discharging into the Grand Calumet River.

We moved into Munster at the same time we did the work in Hessville. We moved into Munster with a sanitary interceptor to remove the pollution of the outfall source from the Munster area that were draining constantly in to the Little Calumet River.

We want to see the Little Calumet River cleaned up. We have an interest in that to do that. We cooperated with Munster.

We took them into the Sanitary District in 1948. We have since taken in by contract, Highland and Griffith, all with the eventual and with the definite idea of eliminating Calumet River.

We haven't completed this in Munster. This is a program in the last two or three years, it is progressing as fast as those towns can get money to tie into our system and as fast as we can add interceptors to this system, this will proceed.

I would like to skip over from that to the finances because the crux of water pollution control in the final analysis has been and always will be finance.

The big problem of the Sanitary Board in the past was lack of funds to finance needed improvements.

Enabling legislation passed by the State Legislature limited the bonding power of the District to a maximum two percent of assessed valuation of the property within the District.

In 1955, this was raised to four percent, four years later to six percent and in 1961, to eight percent.

You will notice that for many years, from 1938 to 1955, industry accelerated at a two percent rate. Since this administration has been in, we have been successful in working with other sanitary districts in the State of Indiana in getting this bonding power increased so we could proceed toward eventual elimination of pollution.

A bill raising the bonding power to ten percent is in the present legislature and has passed the Senate. When passed by the House, the District will again proceed with planned improvements outlined in their engineer's report of 1961.

Bonds outstanding on Table I in this report gives a clear picture of the financial operations of the District down through the years.

Table II shows that the District has used its bonding power to the limit in recent years. The present Board is determined to make every effort to improve conditions in Hammond as money becomes available.

Approximately $670,000 will become available in 1965 as bonding power due to repayment of principal on outstanding bond issues. This will be put to use as soon as the final actions of the legislature are known.

Federal grants have been received by the District totalling approximately $475,000.

More grants will be sought as projects qualify, but it appears that the amount of the grants will have to be increased substantially if Hammond is to achieve ideal water pollution abatement in a short period of time.

This becomes evident when we consider that our planned program of sewer separation covers an area of approximately ten square miles. Estimates of costs, by our engineers are $8,600 per acre. Other engineers' estimates have been quoted as being as high as $15,000 per acre.

Using our engineer's cost estimate, the District will need an additional $55,040,000 for separation of the existing combined sewers.

Planned improvements require another $5,000,000, making a total expenditure of $60,000,000 before total water pollution abatement can become a reality in Hammond.

The taxpayers of the District are willingly footing the bill for the planned improvement of the District, but it will be purely conjecture as to how far and how fast the taxpayers will approve increased bonding powers by action of the State Legislature.

Federal grants that will save the taxpayers substantial interest costs for bond issues would be of great help. Interest costs of $2,588,159 on present bond issues are shown on Table I, to be compared to bond retirement to date of $3,599,400.

Thus, Federal grants would speed up the work for pollution abatement and at the same time, save the taxpayers the bond interest costs.

Moving on to the conclusions. We have heard remarks based on the recommendation of the Health, Education, and Welfare report, recommendations for corrective action.

The Hammond Sanitary District has fully cooperated with the Indiana State Board of Health and the Stream Pollution Control Board in the past and will continue to do so.

We rely on the recommendations for improving the public waters of the area and have gone so far as to agree to disinfecting our treatment plant effluent as soon as we can.

Last year we agreed to install chlorination equipment to sterilize the effluent at an estimated cost of $400,000. However, after reading a recommendation, #5, for a dam built across the Grand Calumet River east of the outfall from East Chicago Municipal Waste Treatment Plant, we are of the opinion the money for sterilization equipment would be wasted, -- this is a first glance.

The dam would cause our plant effluent to flow west continuously in the Grand Calumet and eventually into the Illinois River where natural improvement is found at Peoria. It is our contention that if the City of Chicago does not have to chlorinate their much larger amount of plant effluent, it should not be necessary for Hammond to do so since we have comparable treatment.

We agree that the effluent should be improved only if the suggested dam is placed west of our plant outfall. We realize that natural improvement of the effluent flowing into Lake Michigan through the Indiana Harbor Ship Canal cannot be accomplished. To improve the source of our drinking water supply -- Lake Michigan -- it would behoove Hammond to chlorinate its plant effluent. But, not if natural improvement is found in a westerly flow.

Until the dam location is settled, we will hesitate and will want further studies of the value of chlorination to Hammond.

Hammond has been complying with the recommendation #6 since its treatment plant was constructed. We have secondary treatment and since 1948, have been treating the municipal wastes of the small town Munster, Indiana.

The towns of Griffith and Highland are likewise under contract with Hammond for their municipal waste treatment. The towns, and Hammond, have been moving toward integrated sewer systems as rapidly as money for necessary construction work became available.

In regard to recommendation #7, the Sanitary District constructed sludge lagoons in the flood plain bordering its plant. Constructing lagoons for further treatment of waste effluents is of questionable value since the building of the Cal-Sag channel in Hammond will displace the lagoons. It is our understanding that stage 2 of the Cal-Sag improvement in our area is in the not too distant future, since stage 1 in Illinois is almost completed.

Recommendation #8 has been discussed with recommendation #5.

In the final analysis, it is obvious that the

Sanitary District has worked diligently through the years for better water pollution control on all of its lakes and rivers.

Major steps indicated herein have been taken toward a final solution of the pollution problem.

The one remaining hurdle is sufficient funds for a rapid solution. With the District retiring bonds at the present rate of $670,000 per year and its bonding power exhausted, it will require from 60 to 100 years to complete its water pollution abatement program. It is apparent that other new sources of money will have to be found to expedite the necessary construction in the city and towns.

That is the extent of it, Mr. Chairman.

CHAIRMAN STEIN: Well, thank you very much, sir.

Are there any comments or questions?

MR. POSTON: I note that Mr. Giannina -- you would like to improve the source of your drinking water supply. Lake Michigan, and it would behoove Hammond to chlorinate its plant effluent if, as I understand, if they put the dam in there, to my understanding, from Mr. Miller's statement, that the normal direction of flow of Hammond sewage, under normal lake level conditions, that the flow is toward the west.

Do you then propose to put Hammond sewage treatment plant effluents back into the lake and chlorinate it?

Is that the purpose of your chlorination there then?

MR. GIANNINA: I was going to ask you some of these questions along this line. Maybe we can arrive at a solution. At least give me some understanding. Apparently, which I haven't gotten from your report thus far, I want to make it clear if the dam - this temporary dam the Army Engineers are proposing as a controlling device for this Cal-Sag channel - if it is placed to the west of our effluent there, there will be no chance for our effluent to get to the west. It will have to go to the east and it will go out the Indiana Harbor Ship Canal to Lake Michigan.

Under those conditions, it would behoove us to chlorinate, but I see no reason to chlorinate if the dam is placed east of us and then we are forced to send our effluent to the west. It would be of necessity. It would have to go there. There would be no place else for it to go.

I want to ask, why are you recommending that we chlorinate going to the west into the Illinois water waste and so forth and we will enter the Cal-Sag channel and then so on and so forth where the Calumet Treatment Plant from Chicago empties their effluent, why are we just a few miles away required to chlorinate and not the Chicago Sanitary District?

MR. POSTON: I am kind of like Mr. Klassen. I came to ask questions, not to answer them.

MR. GIANNINA: I am asking you regarding the report, furthermore.

MR. POSTON: My point here has been that Hammond's effluent normally flows to the west and I find it difficult why you want to reverse it back to the source of your water supply. I had --

MR. GIANNINI: I don't care where we go. I want to see we get clean water. If we are forced to go to the east, the Army Engineers are forcing, we are not interested in where the dam is placed.

We are interested in doing the job. If it is placed to the west by the Army Engineers, we will chlorinate, but if, by your suggestion and it is in your report, not mine, it be placed east of us and we have to ship our effluent to the west, why are we required to chlorinate and not Chicago? Why is Lansing, Lansing, Illinois, who buys Hammond water, the same water we treat, they buy it from us, most of the people work in Hammond and East Chicago industry, why are they not asked to chlorinate?

They go through the same system, the same that Hammond does. Why not Bloom Township, they will eventually end up at the Cal-Sag?

I don't understand the report. Why have you singled out Hammond for sterilization and not the other towns and cities?

MR. KLASSEN: I think, Mr. Giannina has a good practical point there of why we would like to see chlorinated effluent come from Indiana.

I would say that in all fairness and I may be -- I don't agree with this report then that I understand that, if your effluent goes to the lake, you will chlorinate, there is no question. If it goes to the west, you will chlorinate if everybody else has to chlorinate?

MR. GIANNINI: Exactly, right. When you set the standards, Mr. Klassen --

MR. POSTON: I --

MR. GIANNINI: I found you to be a very reasonable man.

I have known you from my waterworks days. Of course, these people haven't had much chance to talk.

I have been disappointed in the whole hearing. It's been a wonderful thing, Mr. Stein, I am not wanting to degrade it.

I think you are doing a great public service and I mean, the general public, talking to them, the conditions that are prevailing in our region, I do want to see -- it's become, even though the melodious voice of Mr. Klassen has been a wonderful thing, it's been monotonous hearing him talk and asking the questions.

It is a nice hearing, I have enjoyed it, but --

(Applause)

CHAIRMAN STEIN: Sir, I appreciate your comments but you can't have two things. That is, you can't expect to have state rights and have unanimity. I am as much for states rights as the next one. Once we have state rights -- and the Congress says that the states should invite their people to the conference -- if two states adopt a different policy, this is the price we pay for democracy in America.

MR. GIANNINI: It is a fair price.

CHAIRMAN STEIN: If it bores you, I am sorry.

MR. GIANNINI: It hasn't bored me one bit. It has made me tiresome. It has not bored me at all. I learned something. As Mr. Klassen said, I am glad he said he is learning from us.

I am disappointed that Mr. Klassen hasn't seen fit to invite the people from the Purity League, this lily white section. Why didn't he invite the industry and give them a chance to extol their version?

CHAIRMAN STEIN: Mr. Klassen has answered that.

I think I will answer again.

Mr. Klassen and I were puzzling a little bit about your integrated treatment works and I would have expected we would have heard about the Purity League.

MR. POSTON: I would like to ask one further question and that is, Mr. Gerstein gave some water quality goals for his waterworks intake, water supply.

I wondered, do you think that you should have that same kind of water down in Hammond?

MR. GIANNINI: Yes. And now that you mention Hy Gerstein, I would like to say if I may, Mr. Chairman, he is an old friend, a fine friend. I say, I spent seven years with the Water Department before I got kicked upstairs. I got to know the people. They are the finest in the world.

When Hy Gerstein gives you a set of criteria, you can follow them and not go wrong.

When I was Superintendent of the Water Department, in Hammond, I was a member of the Sanitary District in East Chicago. This was in the early 1950's up to about 1957. I was sitting over there as a member of the Sanitary Board in East Chicago and hearing of this case, that Mr. Chesrow mentioned sometime earlier in the meeting, about the suit that the Supreme Court had. The Master in Chancery was in St. Louis and constantly sending us notices that various Indiana industries were being excused from the suit.

All this time I was sitting in Hammond, trying to filter and clean up the water that was coming out of the Grand Calumet River and finding that we were having just as tough a time as they are today, and I would like to point this out.

We used to make trips and I can give you eye witness reports -- eye witnesses to testify of this and I am

We used to make trips and I can give you eye witness reports -- eye witnesses to testify of this and I am sure, as a lawyer you would appreciate --

CHAIRMAN STEIN: We haven't had much of it here.

MR. GIANNINI: I know you would appreciate it. We have an intake crib there a mile out in the lake and every spring and fall we have to go out and replenish the gas for the light on the crib.

Innumerable times we would go out there and, when the wind is from the south or southwest, because the wave action was less and easier for us poor sailors to navigate, when we got through taking care of the gas, we would swing around Calumet Harbor. You heard, when the wind is off shore the lake immediately drops a foot. On those days and that happened for days at a time whenever the south wind was there, here would come the red discolored water out of the river. This is eye witness testimony. If you want it, I will give it to you.

I saw it innumerable times. We saw the red discharge that would come out and get behind the breakwater and it would swing out toward the Hammond intake and would sit there and when the north wind came, that would bring us phenol in the winter time. We attributed that strictly to the Calumet River.

Now, our State Board of Health people can remember that while I am sitting there on the Sanitary Board seeing our industry being excused from the suit, we are having all of these difficulties with taste and odors coming out of the Calumet River.

I am asking our Sanitary Board people at waterworks meetings, "Well, why don't we institute a suit against the Illinois industries, let's get this thing straightened out."

They said that they wanted to cooperate, they felt they could accomplish more.

CHAIRMAN STEIN: That is right and I think you have an important point. We expect that we will consider the whole area. I think this has been the point of the enforcement provisions of the Federal Act-- the recognition of difficulties and possible inequities that you put out in the fortuitousness of who brings the suit against who. When we cover the area, we cover the whole area.

I think if you follow at least the Federal program or at least our record, if we haven't done anything else, I think we have treated everyone alike.

Our main operation, our main intent is the even handling of the administration of the law, and we try to deal with big discharges, small discharges, upstream and downstream states rights. When you come to chlorination or any discharge of any other lakes, particularly where a stream does not run right between two states, but goes from one state to another, we have always maintained that the state downstream had to have at least a clean-hands doctrine.

Personally, I see no reason for one state to clean up water and send it across the state line and when the other state gets it, it is going to clobber it to pieces.

But, as I read the recommendations here on sanitary wastes, I am sure I quite understand the sensitiveness of the Hammond people.

It says "all sanitary wastes" and I guess this is the phrase you use for that out here.

I think I know what you mean, "all sanitary waste be disinfected before discharge. Disinfection should be practiced in the manner prescribed by state pollution control agencies. This is mutually agreed upon between the two states."

Now, if this is the recommendation, I don't see anything in that that is going to say who is going to sell your interests down the river and that Hammond is going to be required to do something that other communities are not going to be required to do.

MR. GIANNINI: I object that, if that is the case.

CHAIRMAN STEIN: Well, we are all citizens of the United States, and you are a representative of the State of Indiana. We don't want to be made neither fish nor fowl out of one or the other. We want to be treated equally.

MR. GIANNINI: I think, Mr. Stein, I want to offer this constructively to you. If you were to conduct a hearing again of this kind, you would have a much better response -- we from the audience -- there's been some very bad feelings and I have built them up myself in constantly seeing a drumming by one person.

You conduct the hearings, I won't suggest anything -- I think you know best about this, but in a case where you have them from across the state lines, one of Illinois, one Indiana, have our Mr. Poole -- let him say something. He sat here for three days. He is an intelligent man.

A fellow like Mr. Klassen, I respect both equally. If you do that, I think your audience will be more interested.

This is just smack-too-much of one-sidedness and you excuse the fact the Illinois industries aren't on the agenda because you left it to Mr. Klassen.

MR. CHESROW: That is fine, we accept that.

MR. GIANNINI: In all fairness and equality, we haven't had a chance to learn anything from Illinois industries. I would like to learn as I go.

CHAIRMAN STEIN: You may, this is going to be still open.

Let me make this point. As I see this, and I guess we sit here differently and look at things differently.

I don't look at this business of industry testifying from a particular state at all as a disadvantage. I look at it as a distinct advantage. You are right, I have conducted every one of the conferences we have had under the Federal law, there is quite a considerable number, now involving about 700 industries. The most successful conferences we have had have been where industry has come up, been invited to come up and tell their story. The ones where they haven't created, at least psychological problems with the industry.

But, I believe, as I said the other day, that no one can tell the story as well as the industries or the municipalities themselves.

It is the same as you can tell your Hammond story and give your feelings. I don't at all see that the Indiana industries have a disadvantage. As a matter of fact, I think their story came through. Each one will be evaluated on its individual merits.

I don't think that I am making any judgements here, but there are obvious examples of industry in Indiana which have done an outstanding job and availed themselves of the opportunity to say it here.

I don't think they are whipping boys or anything of that kind. Despite the fact that you have heard Mr.

Klassen's dulcet voice most of the time, I think your Indiana industrialists can handle themselves and answer questions.

MR. GIANNINI: I agree. I would like to make this statement.

I felt proud when we had Midwest Steel and National Steel proudly come out and tell what they have done.

I am afraid the Illinois industries are not proud, that is why they are staying away.

They are maintaining we might do a better job if we learned from them. That is the attitude that is taking place.

CHAIRMAN STEIN: Mr. Klassen is the man who is advocating open files.

MR. GIANNINI: How do you like that -- but Mr. Stein, I want to point out one other thing, why some of the feelings develop in Indiana.

This is a peculiar situation but the industry from this area are communities. We are known as coming from the region, and, no doubt, to Indianapolis "the region" is a derogatory remark. What you are doing by conducting a hearing of this nature? You are not only giving us what is known as a region in Indiana, we are going to become a region and nationally it will be that we are a bunch of culprits and we are looking at it that way.

You are mganifying our problem. You make it tougher for us to live it down.

CHAIRMAN STEIN: That is what everyone says when we come in. But in about a year or six months afterwards, they say, pretty generally -- this is the pattern -- "this is the best thing that ever happened." This may be like a tough medicine at first to take but you will like it.

You know, in Sioux City, when we came in -- and Mr. Poole was up there -- we not only had a conference, but we had to go to a hearing and there was the most acrimonious discussion of this Sioux City. It had not grown since the '20s in population -- no new industry. After they put their treatment plant in, they got the All American City Award. They began growing in population, for the first time attracting new industry, and we kind of get a love letter each month from the City Manager and members of the City Council.

MR. GIANNINI: We could use some of that in Hammond. We hope something like that will come about.

CHAIRMAN STEIN: Well, we will give you the idea how to do it to start.

MR. GIANNINI: One more suggestion that I have.

I would like to make a suggestion. You asked, or you asked for someone here to offer the information that the Calumet River, along somewhere in this hearing, only does not, the Little Calumet River does not flow in Indiana. Again, I would like to give eye witness testimony that in the flood of 1954, and again in the flood of 1957, on the Little Calumet River, I saw the Little Calumet River entering into Hammond, proceeding west, and I followed it all the way out to Lake Michigan through the Burns Ditch.

Now, that is eye witness, and I don't care what anybody else may say. I want to point out, it is documented. The Army Engineers' preliminary report on the flood control that they are proposing here will state that also. The Indiana Flood Control System and Water Resources Commission has documented it in their studies on the Little Calumet River.

Whatever anyone else may tell you, you can find it in documents.

That is all I have.

CHAIRMAN STEIN: Thank you.

MR. KLASSEN: Could I readjust my halo here and ask you a question?

MR. GIANNINI: This is the way to do it, with cooperation in a friendly spirit. We used to do it with the waterworks.

MR. KLASSEN: Wait until you hear my question.

I --

MR. GIANNINI: Mr. Klassen, from you it will be wonderful.

MR. KLASSEN: Seriously, I had this here that I wanted to ask you concerning Hammond's policy on sewer extensions on the combined basis.

Do you extend sewers on the combined basis or is this part of a very commendable program of separating sewers?

MR. GIANNINI: Mr. Poole might have told you, in 1957 I took my Mayor down to see Mr. Poole and he explained to us from here on they would request and require we put in separated sewer systems in all new subdivisions and we have taken Mr. Poole's suggestion and lived up to it since 1957.

In fact, in this report, if you will read it, I skipped over it, I am sorry, we would have precluded this question. You will note in the report we mentioned this improvement. There is a sanitary sewer being constructed by the Sanitary District on Sheffield Avenue. The citizens, taxpayers, are going -- this was an industrial area, we are now about to start it in the next 30 days and that is along the line you are asking.

I am sorry I didn't go into it.

MR. KLASSEN: That is all right. As you know, Mr. Poole and I both highly respect each other, but we do check on each other.

He told me this, but I wanted to ask you.

MR. GIANNINI: Are you keeping the Illinois industries away?

MR. KLASSEN: I am not.

MR. GIANNINI: They may help us learn. We all learn from these questions.

MR. KLASSEN: I am not keeping them away. The opportunity has been given to the Chicago Sanitary District to invite the industries and we are told they were invited. They were invited for next week.

MR. GIANNINI: They are not on the agenda.

I would like to have a reason to come back, Mr. Stein. Is it possible we will hear something?

CHAIRMAN STEIN: We are not keeping them off.

MR. GIANNINI: Well, this is your agenda. You don't have it on the agenda.

CHAIRMAN STEIN: The agenda is tentative. I know you have been here most of the time and you have seen how closely we followed the agenda. You know it is available for adjustment. Any time that Indiana industry shows up here, at any time Colonel Chesrow or Mr. Klassen designate them to speak, they will be up right where you are now and I will be all ears and most attentive.

MR. GIANNINI: Very good, and I will join you.

That is all I have.

CHAIRMAN STEIN: Thank you, sir.

VOICE: May I ask a question from the floor?

CHAIRMAN STEIN: I said at the beginning that we cannot accept questions from the floor.

We have been here a week and this has been the pattern. Once we do that, afford this to one person, we have to do it to all.

MR. POOLE: Time is getting late, we had better move on to Lever Brothers, who will be represented by R. D. Tinkham, Counsel for Lever Brothers.

MR. TINKHAM: Mr. Chairman, it is now 4:30. Perhaps if I give my name and address I can sit down, but I will skip a lot of our prepared report and not read at all.

My name is Richard D. Tinkham; I am a lawyer practicing in Hammond, Indiana.

The facts in the statement which has been submitted to the conferees are based on a lengthy hearing, the transcript of the evidence of a lengthy hearing held before the Indiana Stream Pollution Control Board in 1962.

The reason I am presenting the report is I happen to be the one most familiar with the facts contained in that transcript of evidence which is quite lengthy.

I ask that the complete statement together with exhibits be made a part of the record, Mr. Chairman.

CHAIRMAN STEIN: It will be included. Without objection, it will be done.

STATEMENT SUBMITTED BY LEVER BROTHERS COMPANY

Lever Brothers Company, Hammond, Indiana, Plant

("Lever") does not discharge any water or other material to Lake Michigan. It draws raw water from Lake Michigan, uses it in plant cooling processes and discharges it to Wolf Lake. All sanitary sewage and the maximum permitted amount of industrial wastes are sent directly to the Hammond Sewage Treatment Plant. The following subjects will be discussed in this statement:

1. There is no pollution of waters endangering the health or welfare of persons in a state other than that in which the discharge originates.

2. The effect of the pollution on the legitimate uses of the water is not of sufficient significance to warrant the exercise of Federal jurisdiction.

3. All necessary remedial action has been taken by the Indiana Stream Pollution Control Board.

4. Adequate measures have been and are being taken toward abatement of pollution.

The facts stated herein are taken from the transcript of a hearing held before the Indiana Stream Pollution Control Board ("Indiana Board") in February, 1962. Effort has been made to make an unbiased statement of the facts. As a result of the hearing, the Indiana Board and Lever entered into a Stipulation (Exhibit B attached hereto), (See pages 1414, 1415) and the Indiana Board has had the right since September 30, 1964, to enter such final order as it deemed appropriate, subject to Lever's right of appeal, if the order were adverse to Lever.

References to the "Report on Pollution of the Waters of the Grand Calumet River, Little Calumet River, Calumet River, Lake Michigan, Wolf Lake and Their Tributaries," dated February 1965, will be designated as "H.E.W. Report."

1. There is no pollution of waters endangering the health or welfare of persons in a state other than that in which the discharge originates.

Lever operates a plant in the City of Hammond, Indiana, for the manufacture of soaps, detergents, refined glycerine, shortening, margarine and fatty acids. The plant is located in the northwest corner of the City of Hammond between Lake Michigan and Wolf Lake.

Wolf Lake is an interstate body of water, with 565 acres in Indiana and 485 acres in Illinois. (See a map of Wolf Lake showing the location of the plant and other locations, attached hereto, made a part hereof and marked "Exhibit A."

(See Page 1417)

Lever draws raw Lake Michigan water from its own intake in the lake, and after use in the plant cooling processes, discharges it into a pond at the north extremity of Wolf Lake from which the effluent passes under Indianapolis Boulevard and down Wolf Lake Channel. This channel is 6,800

(continued on Page 1416-A)

EXHIBIT "B"

At 1:30 p.m. a discussion regarding the Lever Brothers Company, Hammond hearing was held. Messrs. Richard P. Tinkham and Oliver W. Koester, representing Lever Brothers Company, were present. Mr. Witham informed the Board that Mr. Perry Miller, Mr. Tinkham, Mr. Koester, and himself had worked out a tentative agreement, for consideration by the Board, complying with Mr. Finch's letter of June 27, 1963, and Mr. Tinkham's letter to the Board of July 29, 1963.

On the suggestion of Board members and with the concurrence of Lever Brothers representatives two minor changes to the proposed agreement were incorporated as part of the agreement. It was moved by Mr. Finch and seconded by Mayor Mitten that the Board ratify the following agreement between the Stream Pollution Control Board and Lever Brothers Company to wit:

"Lever Brothers Company will employ an industrial waste treatment expert for an indefinite period on a **retainer** basis, who initially will be Dr. C. Fred Gurnham, to direct applied research for the purpose of attempting to develop methods:

(a) by which existing waste treatment processes can be rendered more effective, and (b) which singly or combined with the existing facilities, will accomplish a significantly higher degree of treatment than is being obtained through the use of existing equipment, all for the purpose of improving the quality of the effluent to the channel portion

EXHIBIT "B"

of Wolf Lake, or the elimination of the effluent therefrom. Lever Brothers Company will submit reports to the Board; the first report will be a six (6) months status report to be submitted on or before March 31, 1964, and semi-annual reports thereafter.

Following receipt of each of the reports, the Board will review the status of the case and after the receipt of the first two (2) reports the Board may, upon notification to Lever Brothers Company, render a judgment or order in this case in accordance with the requirements, powers, duties and procedures as are established in Chapter 214, Acts of 1943, and Chapter 365, Acts of 1947, of the General Assembly of Indiana. In the event any judgment or order is adverse to Lever Brothers Company, it will have and may exercise any and all rights to judicial review, or other relief as provided by the law." The motion carried unanimously.

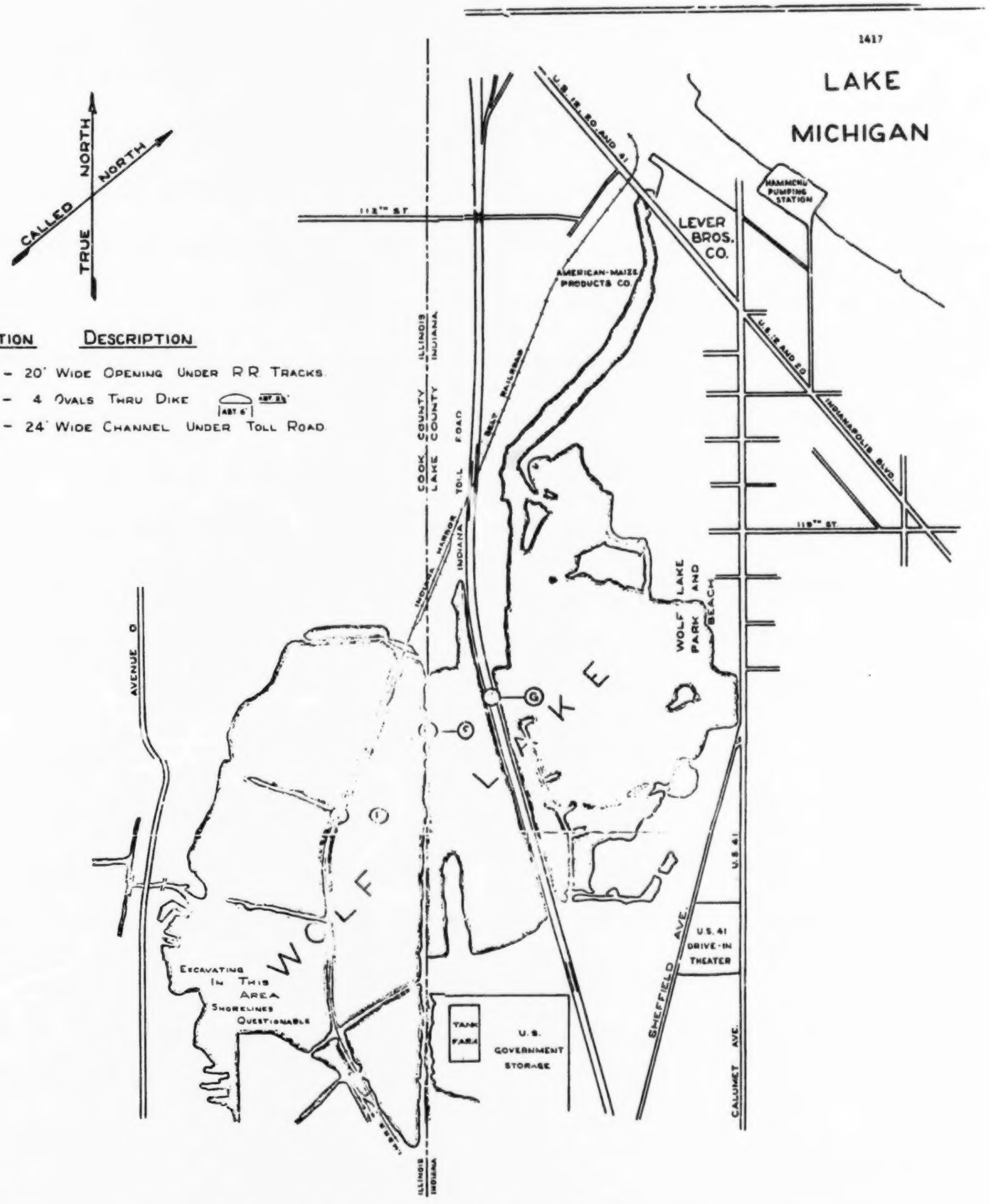
Mr. Koester and Mr. Tinkham acting on behalf of Lever Brothers Company accepted the conditions as set forth in the preceding agreement.

This is to certify that the preceding is an exact record of the minutes of the Stream Pollution Control Board meeting of September 24, 1963, insofar as they record action taken in the case of Lever Brothers Company, Hammond, Indiana.

Signed: B. A. Poole, Technical Secretary.

feet in length and operates as a purifying agent much as a river.

The plant began operation in 1930, at which time a preliminary survey revealed that Wolf Lake Channel was a stagnant pond, covered with green scum, had a disagreeable odor and the entire lake had no source of fresh water except drainage from an area of about 6,000 acres of land in Illinois and Indiana.


TRUE NORTH
CALLED NORTH
LAKE MICHIGAN
HAMMOND PUMPING STATION
LEVER BROS. CO.
U.S. 12, 20 AND 41
112TH ST
AMERICAN-MAIZE PRODUCTS CO.
ILLINOIS
INDIANA
COOK COUNTY
LAKE COUNTY
TOLL ROAD
INDIANA TOLL ROAD
BELT RAILROAD
INDIANA HARBOR BELT
U.S. 12 AND 20
INDIANAPOLIS BLVD.
119TH ST
WOLF LAKE PARK AND BEACH
AVENUE O
WOLF LAKE
E
F
G
U.S. 41
SHEFFIELD AVE.
U.S. 41 DRIVE-IN THEATER
CALUMET AVE.
TANK FARM
U.S. GOVERNMENT STORAGE
Excavating In This Area Shorelines Questionable

Location	Description
E -	20' Wide Opening Under R.R. Tracks.
F -	4 Ovals Thru Dike (ABT 6') (ABT 2½')
G -	24' Wide Channel Under Toll Road.

MAP OF WOLF LAKE

TRACED FROM PHOTOGRAPHS BY
CHICAGO AERIAL INDUSTRIES, INC.
AERIAL SURVEY DIVISION
10265 FRANKLIN AVE.
FRANKLIN PARK, ILLINOIS
PHOTOGRAPHS DATID APRIL 15,1959
THIS TRACING BY C. J. MILLER, JR. ON NOV. 3,1961
LEVER BROS. CO.
INDIANA

EXHIBIT A

SHORELINE REVISED & DATA ON CHANNELS E,F,&G ADDED	JAN 22,'62	

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Analyses of water in the channel showed total solids of 635 parts per million, and similar sampling in the lake proper showed 415 parts per million. Lever presently discharges eight to ten million gallons per day of effluent into the northern terminus of the channel.

This discharge provides a current in the channel and the lake, and is primarily responsible for maintaining the level of Wolfe Lake some two feet higher than the level of the Lake Michigan. Lever believes its effluent actually improves the condition of the channel. Analyses of plant effluent in June, 1964, showed total solids of 204 parts per million.

It was clear at the hearing before the Indiana Board, above referred to, that all of the contaminating material in the Lever waste water was settled out or oxidized by the time the water reached the end of the channel.

Following are the latest figures as to B.O.D of the plant effluent as reported to the Indiana Board:

February, 1964	68 ppm.
March, 1964	139 ppm.
June, 1964	36 ppm.

We are informed that similar samplings by the Indiana Board revealed better results than these.

As appears on Exhibit A, there is a bathing beach on the east side of Wolf Lake proper. The City of Hammond maintains a constant check on the quality of the water at this beach during the swimming season, and it has never been closed due to contamination.

It should also be observed from Exhibit A that there are two barriers to the free flow of water from the Indiana side of the lake into Illinois, consisting of the Indiana Toll Road and a dyke constructed on the Indiana-Illinois state line. These barriers provide openings for the passage of water from east to west of about 24 feet in width. There also appears on Exhibit A further impediment to the free flow of water on the Illinois side, consisting of a railroad causeway, which provides one 20-foot opening for the passage of water.

Surveys and samplings admitted in evidence at the hearing above referred to before the Indiana Board indicate that no contaminating materials reach the opening under the Toll Road appearing as Letter"G" on Exhibit A. It thus must be concluded that none of the contaminating materials in the Lever effluent find their way across the state line into Illinois.

This was confirmed by the H.E.W. report, which stated on page 4: "....investigation by the Public Health Service has not disclosed significant interstate pollution on Wolfe Lake." This was deleted in the Addenda and Errata section of the report. This same statement appeared on page 22 of the report, but this was likewise deleted. The absence of interstate bacterial pollution in Wolf Lake is noted on page 32 of the report. This was not deleted.

References to the clean condition of the water of Wolf Lake are also found on page 14 of the report.

2. The effect of the pollution on the legitimate uses of the water is not of sufficient significance to warrant the exercise of Federal jurisdiction.

The waters of Wolf Lake are not used by the public or any governmental agency for any purpose other than boating, fishing and swimming. There is no industrial or agricultural use of the waters. Even though it be conceded, and Lever does not so concede, that the channel is unfit for all of these uses, it should be observed that the channel consists of approximately 40 acres of the body of water or four percent of the Lake.

Thus, under the evidence adduced at the hearing, above described, 96 percent of Wolf Lake (1,008 acres of 1,050) remains open and available for all the uses to which the lake is put.

The evidence at the hearing, above described, shows that the dissolved oxygen in the channel is more than sufficient to support fish life, except for a short distance about half-way down stream. The dissolved oxygen in Wolf Lake itself approaches the saturation point.

In the Addenda and Errata section of the H.E.W. report, reference is made to the Lever waste as "causing fish kills in a portion of the Lake, and tainting the flesh of game fish in Wolf Lake." At the hearing before the Indiana Board there was evidence of one fish kill in the spring of 1962. Samples of water taken at the site by the State revealed sufficient dissolved oxygen to support fish life. The only specific evidence as to the cause of the kill was given by Dr. Arthur D. Hasler of the University of Wisconsin, who is an expert in the field of zoology and limnology. He gave his opinion that under the facts the kill was due to a natural winter kill, which also occurred at the same time in other lakes in the area.

The Addenda and Errata section of the H.E.W. report also refers to "tainting the flesh of game fish." There was some evidence in the record of the 1962 hearing that fish caught in the channel "tasted like soap". Since no waste waters from soap or detergent manufacturers are discharged to Wolf Lake, it is believed that this testimony was psychogenetic. The word "Lever" is synonymous with "soap" therefore, the fish taste like soap.

It is common knowledge among fishermen that fish caught in ponds or lakes which have no source of fresh water have a "muddy" taste. There was also evidence at the hearing that fish from the lake tasted "real good", but that fish caught in the channel had a muddy, but not soapy taste.

It is submitted that Table VI - 4a of the H.E.W.

report is inaccurate when it states that "soap" is a part of the waste from the Lever plant.

It must be concluded, therefore, that at least 96 percent of Wolf Lake is wholly adequate for the uses to which the lake is put, and that the effect of pollution of the channel is not of sufficient significance to warrant the exercise of Federal jurisdiction.

3. All necessary remedial action has been taken by the Indiana Board.

Since 1937, the Lever effluent to Wolf Lake has been subject to surveys and suggestions by the Hammond Park Board, the Hammond Sanitary District and the Indiana Board. Improvements in treatment and the quality of the effluent to Wolf Lake have been made periodically and progressively since that time.

Better and more efficient treatment methods have been brought to the attention of Lever from time to time. These have been investigated and, where proved feasible, have been put into use. This will be discussed in the next section of this statement.

A survey of Wolf Lake was made by the Hammond Sanitary District in 1942. Certain recommendations were made at that time, and Lever attempted to follow these. In 1946, the Indiana Board and the Sanitary District of Hammond formally designated standards of quality for the Lever effluent. Lever attempted to comply with these standards, and employed a number of industrial waste treatment experts to assist it in doing so.

In 1957, the Indiana Board summoned Lever to a hearing concerning Wolf Lake. As a result of the hearing, the parties entered into a Stipulation, under which Lever agreed to study existing and new treatment methods, to adopt such as proved feasible and to make periodic reports to the Indiana Board.

The evidence at the subsequent hearing in 1962 was undisputed that, except in a few minor particulars, Lever complied with the terms of the Stipulation.

On July 19, 1961, Lever was again summoned to a hearing before the Indiana Board. The hearing was begun on January 30, 1962, and lasted for nine days. The transcript of the oral testimony at the hearing consists of four volumes, totaling 1,378 pages.

In addition, 123 exhibits were admitted in evidence.

As a result of this hearing, a further Stipulation was entered into between the Indiana Board and Lever, a copy of which is attached hereto, made a part hereof and marked "Exhibit B". Lever is now engaged in the performance of its obligations under this Stipulation, as will be detailed in the next section of this statement.

It will be observed that the Stipulation empowers the Indiana Board to enter an appropriate final order if the Board deems that such is indicated. The transcript of this hearing will be made available to the Public Health Service should it be desired.

4. Adequate measures have been and are being taken toward abatement of the pollution.

Beginning as early as 1937, Lever, in conjunction with the Hammond Sanitary Board, the Hammond Park Board and the State Board of Health engaged in studies, experiments and the installation of improvements in efforts to improve the quality of the effluent to Wolf Lake. Lever employed, over the intervening years, a number of experts on the treatment of industrial wastes to advise the Company, and a number of their suggestions have been adopted.

Continuous chlorination of the effluent Lake Michigan water began in 1943 at the suggestion of the Indiana Board. This water is retained in the plant and in the plant processes for a period of one and one-half to two hours, effectively kills harmful bacteria and reduces the algae contained in the effluent Lake Michigan water. Today, automatic chlorination into the effluent waters is maintained 24 hours per day and 365 days per year. The chlorine residual in the effluent water to Wolf Lake is .2 parts per million. Bacteria in the effluent Lake Michigan water are successfully eliminated.

The contaminants in the Lever effluent to Wolf Lake consist of suspended solids and dissolved solids. Lever's treatment processes have effectively dealt with the former, but the dissolved solids present a difficult problem.

Eighty to 90 percent of the suspended solids in the effluent to Wolf Lake are removed by passing the effluent water through skim tanks and then through two Colloidair units, which separate the solids from the effluent water by air flotation and skimming. The Colloidair units were installed in 1952 and have been operated continuously since. The efficiency of these units has been improved from time to time.

However, the dissolved solids in the effluent are not susceptible to effective treatment by any practical method known at this time. Since the dissolved solids are exceedingly dilute, the problem is made more difficult.

It will be observed from Exhibit B, the Stipulation entered into between Lever and the Indiana Board on September 26, 1963, that Lever agreed to employ an industrial waste treatment expert, who initially would be Dr. C. Fred Gurnham of Illinois Institute of Technology, to direct applied research for the purpose of attempting to develop means to improve the effluent.

It will also be observed that Lever is obligated to make a report each six months on the status of efforts to improve the effluent. Dr. C. Fred Gurnham has been retained and has been engaged in active research on this matter since October 1, 1963.

Two reports have been made under the Stipulation.

Studies of the effluent described in the first report reveal that about 90 percent of the foreign material in the effluent (after passing through the present treatment process) consists of dissolved material not susceptible of treatment in the existing treatment facilities. Possible methods of treatment were likewise discussed. One of the current efforts is to attempt to eliminate these wastes at their sources.

The second report was rendered September 30, 1964, and the principal sources of dissolved solids in the wastes were then identified. A substantial amount of this is glycerine in solution. Since this glycerine has a substantial market value, Lever is as desirous as anyone to find a method for its recovery. The third report is due March 31, 1965.

Lever is now assigning a chemical engineer to devote full time to conduct experiments with new methods of treatment suggested by Dr. Gurnham. One of these will be to determine the feasibility of chemical oxidation despite the fact that recent United States Public Health Service studies have been discouraging.

Another will be the use of carbon as a purifier for the effluent. Efforts will likewise be made to reduce the volume of flow to the present treatment facilities in an attempt to secure more efficient operation. Lever is continuing to eliminate wastes at their sources.

It should be observed that the Stipulation of September 26, 1963, gives the Indiana Board the right at any time after the receipt of the first two reports (which have now been received) to enter an appropriate order if the Board determines that such is indicated.

Conclusion

It should appear clearly that the Indiana Board and Lever are doing all that they can at the present time to solve the problem presented. It is, therefore, respectfully submitted that:

1. There is no pollution of waters endangering the health or welfare of persons in a state other than that in which the discharge originates. The contaminating potentials are confined to Wolf Lake Channel, which is wholly in Indiana.

2. The effect of the pollution on the legitimate uses of the water is not of sufficient significance to warrant exercise of Federal jurisdiction. Except for 4 percent of the lake (the channel), Wolf Lake affords full opportunity for boating, bathing and fishing, the only uses to which the lake is put.

3. All necessary remedial action has been taken by the Indiana Stream Pollution Control Board. The Indiana Stream Pollution Control Board has completed one phase of the action prescribed by the Federal Water Pollution Control Act and is in position to take final action if deemed necessary.

4. Adequate measures have been and are being taken toward abatement of the pollution. Present treatment methods now remove the maximum possible amounts of suspended solids under the best known treatment methods. Research and experimentation are now proceeding in efforts to find methods to remove the maximum possible amounts of dissolved solids.

Respectfully submitted,

Lever Brothers Company, by O. W. Koester, Plant Manager, Hammond, Indiana.

* * * * *

MR. TINKHAM: All right, I want to say at the outset that, anticipating a question by Mr. Poston, our records on file and to be filed with the Indiana Stream Pollution Control Board are open to inspection by any authorized person from the Department -- from the Service.

CHAIRMAN STEIN: May I say, with your company, in other parts of the country, we have always received full cooperation with whatever information we wished, whether it has been a research demonstration, enforcement or any program involved with pollution control.

All we had to do is ask.

MR. TINKHAM: I am glad to hear that.

Actually, this was a decision made without knowing what the other plants were doing. So, we are not going to catch the devil for doing it, I guess.

I might say that our plant is located in the northwest part of Hammond.

It draws raw water from Lake Michigan and discharges in the Wolf Lake Channel.

All sanitary sewage and the maximum permitted amounts of industrial wastes are sent directly to the Hammond Sewage Treatment plant.

We have been told on a number of occasions that the plant cannot take any more of our wastes. We will discuss this subject briefly under four sub-divisions.

Number 1, there is no pollution of waters endangering the health or welfare of persons in a state other than that in which the discharge originates.

Number 2, the effect of the pollution on the legitimate uses of water is not of sufficient significance to warrant the exercise of Federal jurisdiction.

Number 3, all necessary remedial action has been taken by the Indiana Stream Pollution Control Board.

Number 4, adequate measures have been and are being taken toward abatement of pollution.

As I said, the facts stated herein are taken from the transcript of the evidence of a ten-day hearing before the Indiana Stream Pollution Control Board. That evidence is contained in four volumes, thirteen hundred seventy-eight (1,378) pages with 123 exhibits. I may say that that also is open to inspection by any of the conferees.

We have attempted to make an unbiased statement of this record. I would ask the members of the conference to open the statement of Lever Brothers to Exhibit A which is a map of the Wolf Lake area.

You will observe, if you will unfold the exhibit, the plant of Lever Brothers Company in the upper right hand corner and you will observe the channel of Wolf Lake just across Indianapolis Boulevard and forms a small pool to the northeast side of Indianapolis Boulevard.

What has already been referred to as Wolf Lake Channel appears running down south on the map. That channel is 6800 feet long.

Our discharges are discharged into the pool northeast of the channel and have the benefits of natural purification for that more than a mile of channel.

When our wastes submerge from the channel in the neighborhood of the islands appearing on the map, our wastes are substantially oxidized and, as a matter of fact, there is no effect upon Wolf Lake proper.

Now, in the beginning when our plant was established in 1930, the channel was analyzed and the lake was analyzed by the Columbus Laboratories here in Chicago.

Briefly, I won't give you all of the data, but, in 1930, the channel had 635 parts per million of total solids. The lake proper had 415 parts per million of total solids.

Today, the channel has less than a third of that sum, 200 parts per million of total solids.

You will note on the map the Wolf Lake Park and Beach over in the right or east side. That beach has been a steady operation and has not been closed due to any contamination from any source.

As a matter of fact, in our local paper, the Hammond Times, someone - I forgot who it was now - in connection with the park was quoted as saying that the water was almost good enough for drinking water.

Now, you will also observe from the lake or from the map that the Indiana Toll Road running about the center of the map and running off to the southeast divides the lake or forms a barrier for the passage of water from east to west.

Point G on the map indicates a 24 foot opening in the Toll Road.

Moving to the left or west, you will find a dike in the middle of the lake on the state line, point F. Point F on that map indicates -- indicates four openings of about six feet each.

Moving further to the west to the Illinois side, you find Point E on a railroad viaduct or a railroad track across the lake and Point E affords a 20-foot-wide opening for the passage of water from east to west.

So, you see, the lake is effectively divided into four smaller lakes.

The passage of water is restricted from the east to the west by these three barriers.

Now, the lake has 1050 acres, 565 of which are in Indiana and 485 which are in Illinois.

We think that our effluent discharged to Wolf Lake Channel has actually improved the quality of water in Wolf Lake, based not only upon the scientific survey of the lake made before the plant was established, but also upon appearance today.

You will note in the picture and the slides taken by the Public Health Service, the lake has a very good color. If you will go out and inspect it today; you will find it has a very good color.

Incidentally, it is our opinion that the Hammond Beach would not be open if it weren't for the Lever Brothers discharge of 8 to 10 million gallons per day. That discharge helps to make a current in the lake which has no source of fresh water whatsoever, except drainage, and discharge from Lever Brothers Company.

We think the lake level which is two feet higher than Lake Michigan is maintained or helped to be maintained by the discharge from Lever Brothers Company.

Now, it was clear at the hearing before the Indiana Board that all of the contaminating materials in the Lever waste water was settled out or oxidized by the time the water reached the end of the channel.

As a matter of fact, the dissolved oxygen in the lake itself approaches the saturation point.

There is only one place in the channel and that is about half way down, as I recall it, where the dissolved oxygen is not sufficient to support fish life and fishing is carried on in the channel and in the lake even through the ice in the winter time.

The latest figures on the plant B.O.D. effluent, February 1964 and March 1964 and June 1964 were respectively as follows: 68 parts per million, 139 parts per million, and 36 parts per million.

Although I haven't seen them, we are informed similar analyses made by the Indiana Stream Pollution Control Board at the same time revealed better results than this.

I am skipping over part of this.

The fact that we contend there is no interstate pollution was well borne out by this evidence. It was also borne out by the original Health, Education, and Welfare report, when it said on Page 4, "Investigation by the Public Health Service has not disclosed significant interstate pollution."

For some reason or other, which we have been unable to find or discover, that part was deleted in the Errata and Addenda section of the report. We don't know why.

Likewise, on page 22 of the report, that was repeated, that there was no interstate pollution. That likewise was deleted.

In the Indiana report which was read by Mr. Miller, on page 39, the same contention is made. Fortunately, that has not been deleted as yet that there is no interstate pollution of Wolf Lake.

References to cleanliness of the water of Wolf Lake is found in several places in the Health, Education, and Welfare report.

There is one place where they say the wild fowl avoid polluted waters, but plenty of them are found on Wolf Lake.

In another place, on page 32 of the Health, Education, and Welfare report, it states there is no significant interstate bacterial pollution of Wolf Lake and this was not deleted.

My second point is the effect of pollution on the legitimate uses of the water is not of sufficient significance to warrant the exercise of Federal jurisdiction.

Now, if you refer to Exhibit A again, this is the map of Wolf Lake, there are ten hundred and fifty (1050) acres in the old lake itself and some 40 acres, I believe, 40 acres in the channel.

The channel constitutes almost four percent of the total acreage. The only uses to which the lake is put are fishing, boating and bathing.

Of those 1050 acres, the public can enjoy, without any restriction whatsoever, except as restricted by the Toll Road and Railroad dike, the railroad crossing or the railroad track and the dike, unrestricted use of the waters of Wolf Lake for the uses to which it is put.

There is no agricultural use of Wolf Lake water whatsoever.

It is not used for drinking water so that we say that Wolf Lake is free and open, 96 percent of Wolf Lake is free and open for all the uses the public wants to put it to and I have talked about dissolved oxygen.

In the Addenda and Errata section of the Health, Education, and Welfare report, reference is made that the Lever waste causes fish kills in portions of the lake and kills game and fish in Wolf Lake.

Now, at the hearing, which was a full-dressed hearing before the Indiana Stream Pollution Control Board, the only evidence of a fish kill in Wolf Lake was that in the spring of 1962 and there was a substantial kill at that time.

The State took samples of the water at the site of the kill and it was revealed that the water had sufficient dissolved oxygen in it to support fish life and the only evidence, absolutely the only evidence as to the cause of the kill was given by Dr. Arthur D. Hasler of the University of Wisconsin who is an expert in the field of zoology and limnology. He gave his opinion that, under the facts surrounding the kill, the kill was due to -- due solely to a natural winter kill and this was further buttressed by the fact that there were winter kills in other lakes in the area at the same time, in which lakes there was no industrial waste deposit whatsoever.

Now, the Addenda and Errata section of the Health, Education, and Welfare report also referred, and I refer to this, "tainting the flesh of game fish."

In the hearing before the Board, the evidence from some witnesses was that the fish tasted like soap.

Well, we believe that that was purely psychogenetic in origin because there is no soap waste or no detergent waste whatsoever sent to Wolf Lake or Wolf Lake Channel by Lever Brothers Company.

The word "Lever" as I say in this report is synonymous with soap and, therefore, naturally, if the fish taste bad, it is soap that causes it.

Now, it is common knowledge among fishermen and I am one--I happen to know Blucher Poole is another--that, if you catch fish in a body of water without fresh water inlets, they have a "muddy" taste.

That's been true in the many years that I have been fishing and I think every fisherman will admit that.

There is evidence in this hearing that fish caught in Wolf Lake proper tasted real good. As a matter of fact, I think one witness said he told the people to whom he fed the fish that he caught them up in the north woods some place and they said they were delicious.

Later on, he told them that he caught them in Wolf Lake, and they were a little doubtful about the quality of the fish.

So, we conclude on this point that at least 96 percent of the lake is as good as any lake in our area and in most areas.

3. All necessary remedial action has been taken by the Indiana Board.

I won't go into the numerous surveys that have been made and surveys that we have made ourselves, and the experts that we have had employed to tell us what to do or to advise us. That is all set out in the statement.

We have attempted to comply with the requests and suggestions made by the Hammond Sanitary District, the Hammond Water Department, the Hammond Park Board, and the Stream Pollution Control Board through the years. We had one hearing in 1957 that ended in a stipulation. We complied with that stipulation.

In January 1962 we had another hearing. That is the hearing I referred to where the record is 1378 pages long and at the end of that hearing, we urged these facts upon the Board that, after all, we were entitled to a reasonable use of the lake and we were only using a part of the channel and that was a reasonable use to support this industry to use only four percent and we don't believe we use even that and that that was a reasonable use of the lake for our purposes.

However, the hearing ended in a stipulation between the Board and Lever under the terms of which we were to agree to employ an industrial waste treatment experiment.

Dr. C. Fred Gurnham, of IIT, was agreed upon and he has been employed and we have submitted two reports to the Board.

Our initial endeavors have been to try to isolate the wastes and stop them at their points of origin and that is under way now.

Incidentally, under the terms of the Stipulation, the Indiana Stream Pollution Control Board has the right to enter any order in this matter, in this pending matter, which they deem appropriate at any time.

Now, we have taken adequate measures, we think, and the measures we feel are the best to accomplish these purposes.

Since 1937, to improve our wastes to Wolf Lake, we continuously chlorinate the effluent 24 hours a day, so if there is a .2 parts per million residual in the waste, there is no bacteria in the waste and the chlorination helps to kill the algae.

The chlorination is in the effluent water so that the chlorine remains in the water, well, it goes to the plant and the detention period is one and one-half to two hours. That is automatic chlorination.

Now, the contaminants to Wolf Lake are suspended solids and dissolved solids. Present treatment process, which consists of two skim tanks and two colloidair units separates the solids from the effluent water by air flotation and skimming process. It takes about 90 to -- 80 to 90 percent of the suspended solids out of the effluent. We think that is good performance.

However, the dissolved solids present a more difficult problem, as all of you here will recognize.

Now, unfortunately, this is not in the written statement -- we don't add very much by way of suspended solids to our effluents.

I was glad to hear, I think it was Mr. LeBosquet say, the other day, that some company couldn't be blamed for the oil they were putting into the effluent because they were taking it in in their water supply intake pipe. That is the case with Lever Brothers.

I have some figures here which are not in the figures in the statement. They are for three days and in March, July, September and December of 1964.

In March, our effluent water contained 166 parts per million of dissolved solids or effluent water contained 180 parts per million of dissolved solids or we added 14 parts per million.

In July, we had - we took in 169 parts per million of dissolved solids. We put out 208 parts per million, so we added 39 parts per million.

The September figures were 177 in, 195 out or we put in 18.

In December, we took in 201 and put out 193 or we took out less than we took in.

We don't know of any methods, any practical and feasible methods at this time to eliminate these dissolved solids from the effluent. They are exceedingly diluted in some 8 to 10 million gallons of water.

We are, however, investigating various methods and we have investigated, as was revealed in our evidence before the Stream Pollution Control Board, many methods including all of the methods that have been suggested through the years.

Our efforts are continuing to improve the operation of our system for the elimination or reduction of suspended solids and to find some means of reducing or eliminating the dissolved solids.

Incidentally, a substantial part of our dissolved solids is glycerine.

Now, glycerine has a very high price and we would be delighted to discover some method of recovering the glycerine that goes out with our waste.

Our third report, under our stipulation, is due the end of this month and will be filed at that time. And the Public Health Service is welcome to a copy of it.

We are now assigning and as soon as we can clear it with the Union, a chemical engineer to devote full time to conduct experiments with new methods of treatment suggested by Dr. Gurnham. One of these will be to determine the feasibility of chemical oxidation, despite the fact that recently United States Public Health Service studies have been discouraging this.

Another will be the use of carbon as a purifier for the effluent.

Efforts will likewise be made to reduce the volume of flow to the present treatment facilities in an attempt to secure more efficient operation.

We are continuing -- incidentally, we have made substantial progress in this field to eliminate wastes at their sources.

Oh, someone mentioned here the other day about education of personnel to avoid spills and to operate the equipment efficiently. That has been done for a number of years at Lever Brothers Company.

Every two weeks there is a meeting with the operating personnel at which a subject is discussed and kept constantly in front of the operating personnel.

In conclusion, we say there is no interstate pollution of water. The only contaminants are confined to Wolf Lake Channel.

The effect of the pollution on the legitimate uses of water is not of sufficient significance to warrant exercise of Federal jurisdiction. Wolf Lake affords the opportunity for boating, bathing and fishing, the only uses to which the lake is put.

All necessary remedial action has been taken by the Indiana Stream Pollution Control Board.

Now, the question may be asked, "Well, why didn't you act before they got after you?"

Well, we thought that what we were doing was the best we could do at that time.

They got after us nevertheless. They got after us and that was our part of our evidence in the case, that we were doing all we knew how to do and all that present science was capable of telling us what to do. We say that adequate measures have been taken by the Stream Pollution Control Board, I mean, adequate measures have been taken or are being taken presently for the abatement of pollution and we are trying to attack our dissolved solids programs at the same time.

In closing, I want to say that somebody mentioned tax help by the State of Indiana. One of the things that I think that could give great impetus to that in this area is to secure some kind of Federal income tax assistance.

Now, I was in this case that Al Meserow was talking about, the State of Illinois against the State of Indiana, in the Supreme Court.

We went to Washington, a group of us at that time, and tried to get some legislation giving rapid depreciation for everything to aid in clearing up pollution.

I would suggest that the conferees might discuss that problem, too. I think a lot of people would be more anxious to proceed immediately with it.

Thank you very much.

CHAIRMAN STEIN: Well, as you may know, on your last point, our basic legislation goes before the Public Works Committee of the House and Senate, I think the members of that Committee, both parties, have indicated they favored legislation of the kind you speak of and possibly others. But the substantive legislation of tax measures goes before other committees and they have not been very receptive as far as I know in any administration.

These proposals have been around since the Truman Administration and the Democratic or Republican administrations and the Treasury Department never have given this legislation a favorable report.

So, I don't know that this group is your best avenue here, although this is being considered again and I think it's become more active. As a matter of fact, Senator Ribicoff put some legislation in the last Session which was somewhat different and kind of a little more modern than the depreciation.

He is taking a tax right off the top and making it more attractive than the five-year depreciation.

MR. TINKHAM: It would be better.

CHAIRMAN STEIN: Are there any questions or comments?

(No response)

Mr. Poole?

MR. POOLE: If I may have your indulgence, I am told for five minutes more, I want to introduce to you one of the most patient ladies. She has sat here from the very beginning of this conference to make a very short presentation on behalf of the South Lake County Stream and Pollution Council. Mrs. G. Hansen, Secretary-Treasurer.

MRS. HANSEN: Mr. Chairman, Honorable conferees, ladies and gentlemen:

I am Geraldine Hansen, Secretary-Treasurer of the South Lake County Stream and Pollution Council.

The South Lake County Stream and Pollution Council realizes that our community is contributing to your pollution problem in the Chicago-Calumet region. We also are aware of the extreme danger to the health and welfare of the whole community. We have been hacking through a jungle of bureaucracy and legislative formalities to no avail; therefore, our appeal at this time is for your help and assistance.

The pollution problem, as expressed by the President of the United States in his recent State of the Union and Inaugural Address, are very serious.

Scope: Local and state authorities have either been unwilling or unable to help with these problems. At the present, untreated or inadequately treated sewerage is being permitted to be discharged into streams which eventually flow into the Little Calumet River (West).

Summary: All Lake County citizens, and specifically those interested in conservation, are extremely concerned with this pollution problem. Lake County is 28,000 acres short for Park Land. These Park Lands would include lakes and/or streams which would be used for boating, fishing and swimming.

The Little Calumet River (West) is now being polluted by improper and inoperative septic tanks, by plant waste and improperly operating municipal and private sewerage treatment plants. This polluted water is reaching the Little Calumet River (West) by the following contributing streams:

The Beezer Ditch, which along with the #1 Spur, Graper Ditch and Niles Ditch all flow into the Beaver Dam Ditch, which in turn flows into Deep River, which empties into Lake George in Hobart, Indiana, which again flows into Deep River, which empties into the Little Calumet River (West). Turkey Creek also picks up Kaiser Ditch, and then flows into Deep River ahead of Lake George in Hobart.

Conclusion: If the laws we now have on the County and State level were properly enforced and new Federal pollution laws were to be enacted with stiff penalties for violators, this would be the solution to the pollution problem. But, no law is any better than its enforcement!

Thank you.

CHAIRMAN STEIN: Thank you, Mrs. Hansen.

It is groups like yours that keep us on the ball. Without you we might deteriorate.

MRS. HANSEN: Never underestimate the powers of a woman.

Thank you.

CHAIRMAN STEIN: I never have. I am surrounded by them at home.

(Laughter)

MR. POOLE: I am not going to make any closing speech on behalf of Indiana. I think you heard enough from Hoosiers in the last few days, notwithstanding the fact that I want the rest of the conferees to know the State of Indiana recognizes that there is still problems and particularly with respect to the south end of Lake Michigan. We will keep working at that problem at an accelerated rate and within the limits of our resources.

CHAIRMAN STEIN: Thank you, we have two statements here which have been submitted for the record by Mr. Poole.

One is from the Town of Chesterton Utilities, by order of Mr. James R. Barrington, P.E.

At this point, it will be included in the record.

STATEMENT OF CHESTERTON TOWN UTILITIES

At the direction of the Chesterton, Indiana Town Board, I, Mr. James R. Barrington, Professional Engineer, and Superintendent of the Chesterton Sewage Disposal Plant, present the following statement to the Department of Health, Education, and Welfare at the Water Pollution Conference held March 2, through 6, at McCormick Place, Chicago, Illinois.

Part I. Recitation of the facts as to the financial obligation assumed by the citizens of Chesterton, Indiana, to abate their pollution of the Little Calumet River.

1. A revenue bond has been issued in the amount of $720,000.

2. Interest plus operational expenses raise the total obligation to $2,440,000 over the next 30 years.

3. This is $1,740 per household user; or $542 per capita. (Population 4,500).

Part II. Recitation of the facts as to the sewage plant constructed with the above money.

1. One twin unit 750,000 gpd (each half) 1.5 mgd total treatment capacity plant.

2. Including 2 aerated primary tanks, 2 aerators, 2 final tanks, 1 chlorine chamber, 2 digesters, 1 vacuum filter unit; plus structure, pumps, compressors, and all sanitary equipment.

Part III. Recitation of the facts concerning operation of the plant.

1. The plant has been in operation since June 1, 1963.

2. The plant processes 400,000 gpd, or 146 mgy.

3. We give primary treatment, secondary treatment and chlorination.

4. Based on design we are using 20 percent of capacity. Based on volume we are using 25 percent for future users.

Part IV. Recitation of results obtained. The citizens of Chesterton, Indiana, have eliminated their pollution of the Little Calumet River. Test results show - treated sewage discharged into the River 400,000 gpd, having the following analysis. Temperature 45 to 75 degrees Fahrenheit. pH 6.8, dissolved oxygen 2-3 ppm. relative stability test greater than 30 days. BOD removal without chlorination 90 percent. BOD with chlorination, nil. Note: we carry 3-4 ppm. free chlorine to compensate for additional pollution due to raw sewage being dumped into our final effluent. Suspended solids: oil, grease, etc., nil.

By order of the Chesterton, Indiana Town Board.

Signed, James B. Barrington, P.E.

CHAIRMAN STEIN: At this point we will stand recessed until 9:30 a.m., Tuesday, in room 11 of this building, and don't get confused with the boat show.

Come back to McCormick Place.

We stand recessed until Tuesday, thank you.

(Whereupon the Conference in the above entitled matter was adjourned until March 9, 1965 at 9:30 a.m.)